TAMPERE UNIVERSITY OF TECHNOLOGY
Faculty of Business and Technology Management

XUEPIN ZHAO

KNOWLEDGE MANAGEMENT PRACTICES IN LARGE ENTERPRISES

ABSTRACT

Businesses incline to be increasingly global, with more tensed competition and complex relationships with various stakeholders. Companies nowadays are facing flexible markets, rapid-improving technologies and innovations, changed trends of businesses, and large amount of overlapped information and knowledge.

To give the correct responses to the changing environment and circumstances, it is necessary for companies to access to the information and knowledge they need. It is vital to obtain important information and knowledge, organize them, refine them, improve them, assimilate them, and reuse and apply them in the future businesses. Knowledge management is becoming more and more important, to solve all these problems.

However, there are still some companies, also large enterprises, ignoring the work of knowledge management, lacking efficient IT tools and proper organizational culture, without feasible and effective organizational processes. It is a question for enterprises that how to capture knowledge they need, how to access to the information fast, how to refine obtained knowledge, and how really apply correct knowledge in real business processes.

Meanwhile, companies may be still confused that what would be the most important part for knowledge management improvement. It is essential for large enterprises to know that only highlighting knowledge management as slogans is not enough. It is much more important for them to understand different tools in knowledge management and how to improve the most important one of them in daily work. Organizational culture of knowledge management is meaningless, until companies really understand the correct methods to effectively and properly manage and improve the performance of knowledge management.

This thesis will introduce the importance and basic of knowledge management and its practices. Different methods and tools of knowledge management and the mainly important aspects of knowledge management will be illustrated. It will be introduced that according to existing literature, how knowledge management system is currently performed in large enterprises, and what are the weakest parts in knowledge management. Theoretical structure will be proposed to improve knowledge management, providing the most important and efficient practical ways. With empirical data carried and analysed by qualitative research methods, the theoretical structure for knowledge management improvement in large enterprises will be verified, and the final result will be concluded. Further research avenues are recognized especially in the area of organizational culture improvement and knowledge management process phases refining.

Xuepin Zhao

PREFACE

Studying the background, importance and theories of knowledge management, this thesis is trying to discover the weaknesses for knowledge management in large enterprises, and to propose the best ways for improvement. Theoretical structure is proposed according to existing literatures, and empirical researches are carried out with interviews. I got a lot during the entire process not just the theories, but the current situation of knowledge management in large enterprises. The most importantly, I really understand, appreciate and highlight the significant role knowledge management plays in large enterprises' future improvements. This study changes my perspective of analysis and riches my thoughts for problem solving, which is helpful and valuable for my future career.

Hereby, I would love to thank my supervisor Dr. Nina Helander and Professor Hannu Kärkkäinen for their patient guidance and invaluable suggestions, especially the strong motivations and supports offered by Nina during the whole process. Also, five interviews are held with five respondents, and thanks a lot for valuable comments and feedbacks given by Ms. Emily Zhao, Mr. Ke Li, Ms. Ann Xiao, Mr. Haibo Ni, and Mr. Fang Du. Finally, I would like to thank my families and friends for their supports and encouragements during this one-year study.

Xuepin Zhao

Tampere, Dec. 2014

TABLE OF CONTENTS

1 INTRODUCTION

1.1 BACKGROUND

According to Ghaziri and Awad (2004), there is a type of consumer in the market nowadays called “prosumer” which refers to customers who are more educated and demand more. They are not any more in the passive market where products are offered at the exact face value. Meanwhile, they provide feedbacks to manufactures about the design of the products and services from the perspective of customers. This phenomenon causes the changes in business world that although recent technologies such as email, networking and internet have developed already in a high speed, business has yet to fully respond to the social, cultural and technical challenges. However, a positive response to knowledge sharing and management tend to start appearing. (Awad & Ghaziri, 2004)

Due to the globalization and high-speed changes in business world, competitive environment is becoming more unpredicted and complicated. This leads to new challenges that companies nowadays have to face. The environment of globalized business is characterized by changed commercial conditions, market liberalization, high production, information and communication technology, flexible organizational structure of enterprises, and partnership development. Therefore, companies are forced to create and develop new technologies and techniques, and to gain lasts messages of businesses. This ensures higher quality and better functionality of products, lower production costs, better answers to increasingly complicated customers’ demands, and correct responses to fast changing markets. (Danijela, 2011)

There is no doubt that through different methods, vast amount of information and data have been collected in businesses in the past decades, to help enterprises understand the circumstance of current businesses. However, it is not enough just to obtain textual and explicit information. Tacit information, skills and knowledge are becoming more and more crucial. Moreover, it is quite difficult to successfully access and obtain existing information, to correctly absorb required knowledge, to efficiently organize, refine and assimilate collected information, and to effectively reuse and apply them. All these difficulties are asking for attention and emphasis of knowledge management. It is a vital part of business management and the key topic of this thesis.

One of the most key elements in knowledge management is knowledge sharing, which has already shown its benefits today. For example, the internet is an example of knowledge sharing. It stimulated its development and growth through fast and timely sharing of knowledge. Sharing knowledge, organization can create new

knowledge and benefits from the knowledge people shared and learnt from others. This makes the business processes faster, more effective and closer to success, and empowers the employees in a unique way.

In business processes, knowledge management has a positive impact as well, with the goal that generating the tacit knowledge required, and encouraging knowledge workers to share knowledge with peers. This leads to result that it is easy for the organization to tell which process is more effective while which is less than others. It is obviously difficult in initial capture of knowledge, but once succeeding in generating and delivering knowledge, benefits come endlessly. Knowledge assets can be more fully used and supported, benefiting the company. For example, the company can position itself in respond to customers, create new markets, develop new products, and dominate emergent technologies, quickly, rapidly and accurately. (Awad & Ghaziri, 2004)

With different key points, the importance of knowledge management is proposed by different researchers. Three of them are introduced in this thesis: Quast, Ghaziri and Awad, and Dalkir.

According to Quast (2012), it is usual that employees feel difficult to find out the knowledge required when they need during the work processes. Another common similar phenomenon is that when dealing with a project, the knowledge needed is somewhere else but not known to employees. When knowledge management is carried out successfully, it is easy for an organization to capture and deliver the knowledge of senior employees to new or younger employees who can make immediate use of the knowledge and even improve the knowledge to make the business run more smoothly and more effectively. There are three key reasons to interpret the importance of knowledge management (Quast, 2012):

- Decision-making capabilities
- Learning organizations
- Cultural change and innovation

Firstly, facilitate decision-making capabilities. It is suggested by Quast (2012) that data can offer manager a wealth of information but overloaded information or information required from people in other parts of the company may be barriers for decision-making capabilities. Thus, applying knowledge management systematically can facilitate the decision-making process better, more effectively, and more informed decisions. Secondly, knowledge management builds learning organizations by making learning routine. According to Quast (2012), this aims at create a culture where everyone continuously assesses themselves, their units, and their organization, looking for ways for promotion and improvement. As previously introduced, learning culture is crucial and basic in knowledge management that

tacit knowledge is shared and learnt by everyone else in the organization. Finally, actively managing organizational knowledge can stimulate cultural change and innovation by encouraging the free flow of ideas. With the phenomenon of knowledge management, knowledge is encouraged to be shared and learnt anytime. New knowledge is accessible to every member in the organization and experiences can be shared and delivered across the whole company. Creativity and cultural change would occur over time.

From the perspectives of Ghaziri and Awad (2004), in addition to what have been introduced previously, there are more justifications of knowledge management. They are the important reasons for organizations to develop knowledge management.

Firstly, it is argued that knowledge management creates positive impact on business processes, and enables organization to position itself quickly and correctly. Secondly, with good knowledge management, mutual trust is built between workers and managers. Cooperation is highlighted and learning curves can be shortened by knowledge sharing. Thirdly, knowledge management helps less-trained employees achieve higher performance levels, enhances employee problem-solving capabilities, and avoids situation of “brain drain”. Fourthly, systematic and superb knowledge management system ensures the successful collaboration and core competencies with suppliers, vendors and customers. Finally, it provides the access to customer-reference and resource files.

Despite of these, knowledge management is treated importantly as key intelligent assets (Dalkir, 2005). According to Dalkir (2005), the growing importance of organizational knowledge as a competitive asset was recognized by a number of people, such as Kaplan and Norton, and Edvinsson and Malon (1997). They saw the value in being able to measure intellectual assets. Dalkir (2005) argues that behind today’s increased interest and application of knowledge management, the major business drivers and reasons lie in four key areas, making knowledge management so important:

- Globalization of business
- Leaner organizations
- Corporate amnesia
- Technological advances

Firstly, globalization tends to be the main trend today in business world. Organizations nowadays are increasingly more global than before with multisite, multilingual, and multicultural in nature (Dalkir, 2005). This brings organizations more different kind of knowledge to demand, capture, organize, and utilize. Knowledge management therefore becomes important for organizations under such

a global environment. Secondly, leaner organizations require reducing costs, promoting outputs, which refers to improving the effectiveness of operation of organizations. It is necessary to complete more work and to accomplish faster. To improve the effectiveness, smarter employees especially knowledge workers are required to increase the pace and workload (Dalkir, 2005), which would be solved by knowledge management. Thirdly, according to Dalkir (2005), corporate amnesia is caused by the mobile of the workforces. As employees are more mobile as a workforce that they are no long expected to work for the same organization for the whole careers, problems in knowledge continuity are caused for the organization, and continuous learning demands on knowledge workers are placed. As introduced previously, knowledge continuity and continuous learning demands on knowledge workers can be handled by knowledge management systems. Finally, technological advances, such as information technologies, network systems, and remote control systems, have made connectivity not only ubiquitous but has radically changed expectations. People are expected to be on at all times and the turnaround time in responding, and this would be measured not in weeks as before, instead, in minutes. Knowledge management can also deal with this demand and fulfill the expectations in respond to the changes of technological advances. (Dalkir, 2005)

Table 1. Drivers and benefits of knowledge management

	Quast (2012)	Ghaziri and Awad (2004)	Dalkir (2005)
Drivers		• Prosumer • Recent technology	• Globalization of business • Leaner organizations • Corporate amnesia • Technological advances
Benefits	• Better decision-making capabilities • Build learning organizations • Stimulate cultural change and innovation	• Positively impact business processes • Mutual trust • Cooperation, short learning curves • Higher performance levels • Better problem solving ability and less “brain drain” • Successful collaboration and core competencies • Access to resources	

To conclude the importance of knowledge management, no matter the drivers, reasons or justifications of it introduced previously, the perspectives of three researchers are adopted as the main point of view of this thesis in the importance of knowledge management. As illustrated in Table 1, main advocacies of each researcher are listed and concluded. Drivers and benefits of knowledge management are demonstrated, to show why and how important it is.

It is obvious that in the context mentioned, companies in all sizes are facing problems for knowledge management and challenges for improvement. Sedera (2009) has made a survey among small, medium and large enterprises, and got the result analyzed and scored from value 1 to value 7. The result is shown in Figure 1.

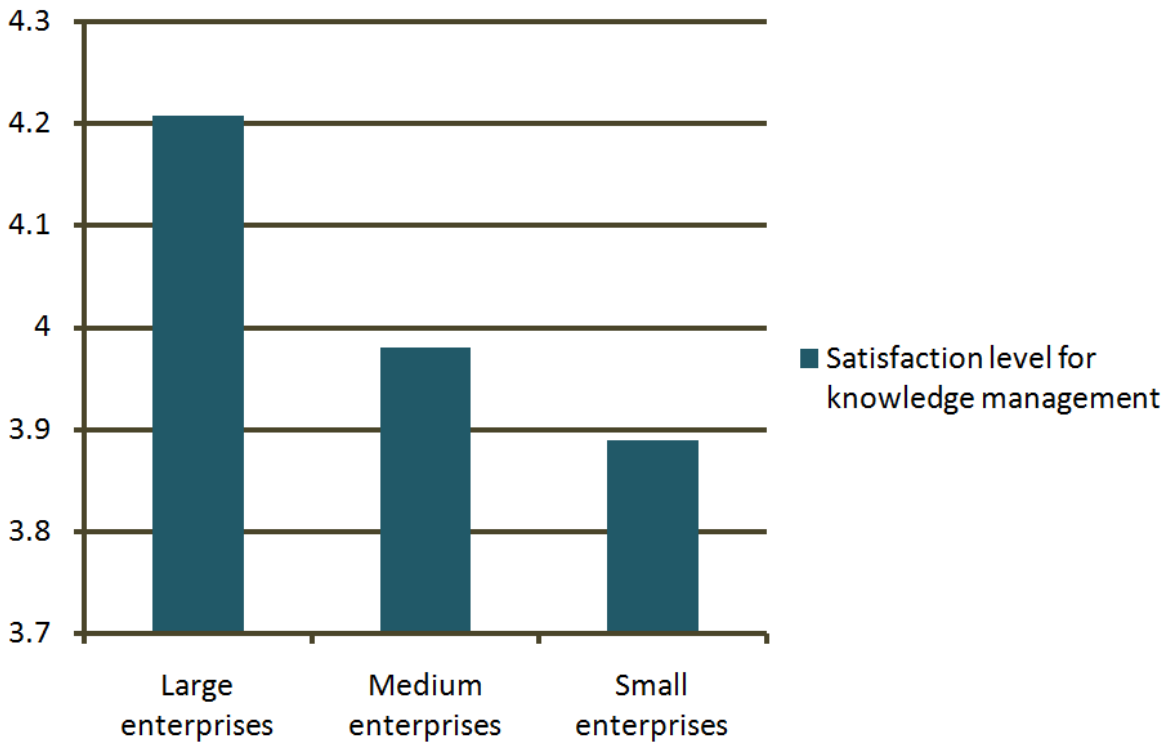

Figure 1. Satisfaction levels for knowledge management of enterprises in different sizes. (Sedera, 2009)

As shown in Figure 1, satisfaction level for knowledge management is declining with the decrease of enterprises' size. Small and medium enterprises (SMEs) show less satisfaction than large ones. However, in this thesis, knowledge management in SMEs will not be discussed. Instead, knowledge management in large enterprises is the main topic. Research is done to find out what kind of weaknesses still exist in current system for knowledge management in large enterprises and what solutions are the best ways to face these challenges.

1.2 Objective of the Research

Although there has been a long time for development of knowledge management, there are some weaknesses and challenges in actual performance. Large enterprises, which have already developed knowledge management systematically, still have problems and weaknesses in this field. Thus, the objective of this thesis is…

…to discover the weaknesses for knowledge management in large enterprises, and to propose the best ways for improvement.

1.3 Structure of the Thesis

The main structure of this thesis is to get theoretical structure and solutions based on the theories from literatures, and to check the validity by empirical data.

This chapter is introduction of background and objective of this thesis. The second chapter describes the basic research methods and which of them are used for this thesis. It also illustrates the entire research process to complete this thesis. The third chapter is about basic theories of knowledge management. In chapter 3.1, definition of knowledge management is given and key concepts are explained one by one. In chapter 3.2, importance of knowledge management is demonstrated according to different literatures and authors. Chapter 3.3 describes categories, strategies and processes of knowledge management. In chapter 3.4, current system for knowledge management in large enterprises is illustrated according to literatures and weaknesses are found out. In this chapter, theoretical structure is also given to improve weaknesses of knowledge management in large enterprises. The fourth chapter is about empirical data, to check the validity of theories and theoretical structure. The chapter five is conclusion and the final chapter is references.

2 REASEARCH METHODS AND PROCESS

2.1 RESEARCH METHODS

Research is to generate new concepts, methods and understandings by creating new knowledge and using existing knowledge in a innovative and new way. This includes synthesis and analysis of previous research and leads to new and creative outcomes. (Donnell, 2012) Research methods are defined as general expressions to describe particular phenomenon. They are applied for an entire framework which is used to look at reality, based on philosophical stance (Clarke, 2005). Research methods are classified into six fields:

- Historical (Clarke, 2005)
- Existing material
- Questionnaire survey
- Interview
- Observation
- Action research (Gummesson, 1993)

Historical method provides evidence by establish facts and gives conclusions about past events and issues. It is the objective and systematic evaluation and synthesis. In this field, all objective points are offered. For example, the time and places the event happened, also the people participated in. According to Gummesson (1999), existing materials involve all things carried by other media except human beings. It can be all the written and printed paper or electronic documents such as reports, articles, records and notes. It can also be stored data in different forms such as computer database, charts, statistics and photos. Questionnaire surveys involve contacts with respondents through personal way, semi-personal way such as telephone, and non-personal ways such as email. Interviews focus on groups and problem detection study with fewer limits than questionnaire. It is operated by the questions without any pre-established order and the corresponding answers are open-ended. Observation requires sight, hearing, touch, smell, taste and feeling, which aims requiring researchers to describe the process they observe correctly. Action research is as similar as observation but asks the researchers' active participants which influence the process under study. Besides, however, from another view point, research methods are usually divided into two main categories as illustrated in Figure 2: quantitative research and qualitative research.

Figure 2. Quantitative research and qualitative research

Firstly, quantitative research methods collect numerical data, analyze the data by mathematically based methods, and then use analyzed result to explain phenomena (Muijs, 2010). The key point of this research measurement is to keep the process objective, quantitative and statistically valid. It is process involve counts and measures of things, which is all about numbers, calculations, and formulas.

Secondly, qualitative research methods collect, analyze, and interpret data by observing people's activities such as what they do and say. This is about meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things. (Anderson, 2006) Qualitative research methods seek to understand the topic and problem of a given research from points of local population. They also effectively get culturally specific information those involve values, opinions, behaviors, and social contexts of particular populations. (Mack et al, 2011)

According to Mack et al (2011), the main differences between these two research methods are embodied primarily in:

- Analytical objectives
- Types of questions proposed
- Types of data collection methodologies used
- Forms of data produced
- Degree to the flexibility of study design

The comparison of quantitative research and qualitative research approaches is demonstrated in Table 2. It is illustrated in details from diverse aspects.

Table 2. Comparison of quantitative and qualitative research approaches (Mack, Woodsong, MacQueen, Guest, & Namey, 2011)

	Quantitative	Qualitative
General framework	• Seek to confirm hypotheses about phenomena • Instruments use more rigid style of eliciting and categorizing responses to questions • Use highly structured methods such as questionnaires, surveys, and structured observation	• Seek to explore phenomena • Instruments use more flexible, iterative style of eliciting and categorizing responses to questions • Use semi-structured methods such as in-depth interviews, focus groups, and participant observation
Analytical objectives	• To quantify variation • To predict causal relationships • To describe characteristics of a population	• To describe variation • To describe and explain relationships • To describe individual experiences • To describe group norms
Question format	Closed-ended	Open-ended
Data format	Numerical (obtained by assigning numerical values to responses)	Textual (obtained from audiotapes, videotapes, and field notes)
Flexibility in study design	• Study design is stable from beginning to end • Participant responses do not influence or determine how and which questions researchers ask next • Study design is subject to statistical assumptions and conditions	• Some aspects of the study are flexible (for example, the addition, exclusion, or wording of particular interview questions) • Participant responses affect how and which questions researchers ask next • Study design is iterative, that is, data collection and research questions are adjusted according to what is learned

2.2 RESEARCH PROCESS

The work process of this thesis is shown in Figure 3. Firstly, the entire structure and table of content of this thesis are discussed and decided. This period started in 2013 from November till December.

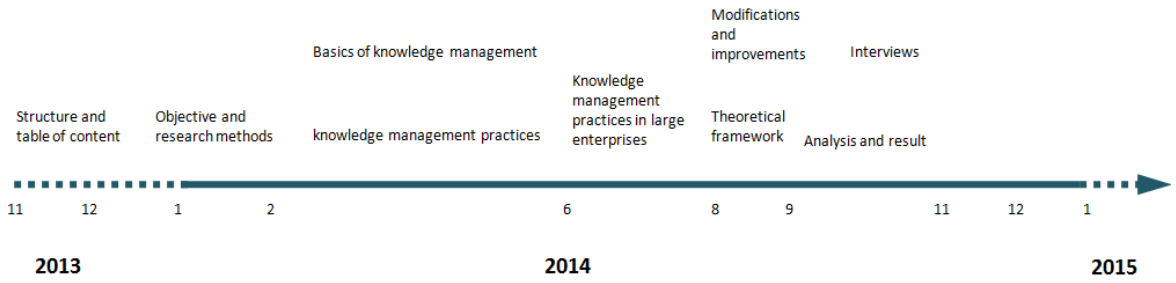

Figure 3. Research process of this thesis

Secondly, relevant theories and literatures are checked and studied. This period began in January 2014 and lasted 9 months till the end of September. Objective and research methods were set in January. The basic theory of knowledge management and practices of knowledge management have been done since February to June. It took 2 months to complete the research of knowledge management practices in large enterprises, which is discussed in chapter 3.4.1 and chapter 3.4.2. From August to September, modifications and improvements were done several times, and the eventual theoretical framework was proposed. Finally, to gather the empirical data and to prove the validity of theoretical framework, interviews and analysis were done till the end of November.

During the one year, meetings, conferences, discussions and interviews were carried out many times. Interviews are made with employees in some large enterprises in China. They are large enterprises international or local. Employees participated in interviews are in different industries and at different kind of positions. The main idea is to find out the actual performance of knowledge management in different enterprises.

The basic and main research methods of this thesis are qualitative research approaches. In the theoretical part, existing material and content analysis were

carried out, to access, study and understand the main ideas and key concepts of knowledge management. At the stage of empirical data analysis, interviews and content analysis were adopted to find out the validity of theoretical framework of this thesis.

3 KNOWLEDGE MANAGEMENT

3.1 BASICS OF KNOWLEDGE MANAGEMENT

Ghaziri and Awad (2001) have defined knowledge management as a new coming business model with the framework of organization focusing on knowledge. It comes from many disciplines, including business, economics, psychology, and information management. It determines the key and ultimate competitive advantage of enterprises.

According to Ghaziri and Awad (2001), the target of knowledge management is to help an enterprise to treat all its processes as knowledge processes. These processes include knowledge creation, dissemination, upgrade, and application toward organizational survival. Thus, the renewed responsibilities of knowledge organization focus on managing knowledge as intangible asset, hiring knowledgeable employees and experts. It is as the same way as hiring an investor for management of financial portfolio. The key of knowledge management involve people, technology and processes in overlapping parts as shown in Figure 4. (Awad & Ghaziri, 2004)

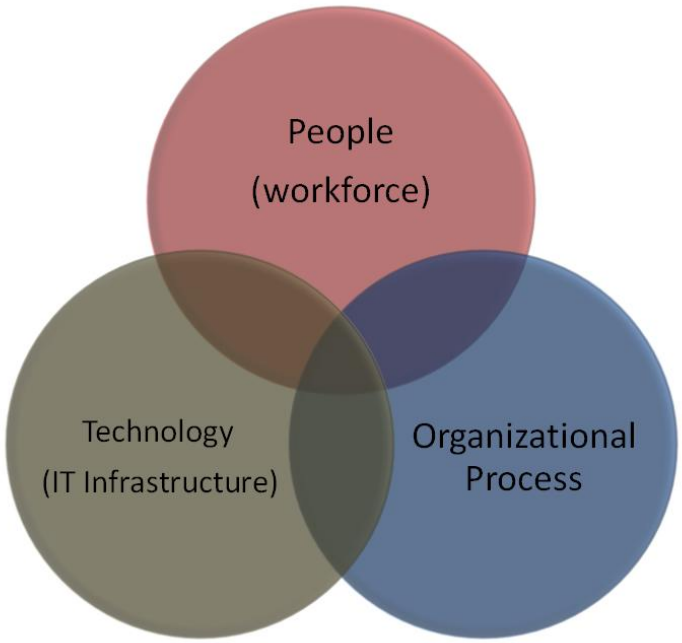

Figure 4. Key fields of knowledge management (Awad & Ghaziri, 2004)

It is suggested by Ghaziri and Awad (2004) that knowledge management involves capturing and taking advantage of useful knowledge and skills of an enterprise. Since people, technology and organizational process are taken into account as key elements of knowledge management, these useful knowledge and skills can be

collected from everywhere relevant to the business such as paper, documents, databases and people's mind. Meanwhile, knowledge management was defined by Debowski (2006) as the process of identifying, capturing, organizing and disseminating the intellectual assets that are vital to the organization's long-term performance. It is highlighted that knowledge is the process of interpreting information and past experience into a meaningful set of relationships that are understood and applied by an individual. Because employees and organizational data have become increasingly crucial to organizations' outcomes and competitiveness, the concept of knowledge management has emerged. (Debowski, 2006)

3.1.1 DEFINITION OF KNOWLEDGE MANAGEMENT

Obviously, there is no one single way that how an enterprise manage knowledge. Instead, a big number of ways can be used in knowledge management of an enterprise. According to the diversity of knowledge management, the generic and broad definition was developed by Hislop (2009): "knowledge management is an umbrella term which refers to any deliberate efforts to manage the knowledge of an organization's workforce, which can be achieved via a wide range of methods including directly, through the use of particular types of Information Communication Technology (ICT) , or more indirectly through the management of social processes, the structuring of organizations in particular ways or via the use of particular culture and people management practices." Despite of Hislop (2009), definitions from other researchers are demonstrated together in Table 3.

Table 3. Definitions of knowledge management of different researchers

Ghaziri and Awad (2004)	Knowledge management refers to capturing and taking advantage of collective expertise of an enterprise from everywhere relevant to the business such as paper, documents, databases and people's mind.
Debowski (2006)	Knowledge management is the process of identifying, capturing, organizing and disseminating the intellectual assets that are critical to the organization's long-term performance.

Hislop (2009)	Knowledge management is an umbrella term which refers to any deliberate efforts to manage the knowledge of an organization's workforce, which can be achieved via a wide range of methods including directly, through the use of particular types of ICT, or more indirectly through the management of social processes, the structuring of organizations in particular ways or via the use of particular culture and people management practices.

Thus, combining the definitions listed in Table 3, knowledge management in this thesis is defined as:

Knowledge management refers to the process of identifying, capturing, organizing, and taking advantages of intellectual assets of the organization, via the use of particular types of ICT, organizational culture and members, and organizational processes.

To interpret the definition of knowledge management, it is necessary to explain some key concepts in the definition:

- Knowledge asset
- ICT in knowledge management
- Organizational culture and members
- Organizational processes

All the four key elements in the concept of knowledge management will be interpreted one by one in following chapters.

3.1.2 KNOWLEDGE ASSET

It is important to understand what knowledge asset refers to in the definition. Each person possesses unique knowledge asset, drawn from experiences and sources encountered over the years. There is a hierarchy called Data-Information-Knowledge-Wisdom (DIKW) hierarchy, which is first specified in detail by Ackoff (1988). This hierarchy is based on filtration, reduction, and transformation. It points out that data leads to information, which leads to knowledge, which in turn leads to wisdom. (Bernstein, 2009) As the objective of this thesis focuses on knowledge, wisdom would not be discussed in the further content. Data,

information and knowledge, according to Ackoff (1988), each of these include the categories that fall below it. It is estimated that on average about forty percent of the human mind consists of data, thirty percent information, twenty percent knowledge, ten percent understanding , and virtually no wisdom. (Ackoff, 1989) This allows us to view the hierarchy model as a pyramid as illustrated in Figure 5 and indeed, it has been described as this ever since (Rowley & Jennifer, 2007).

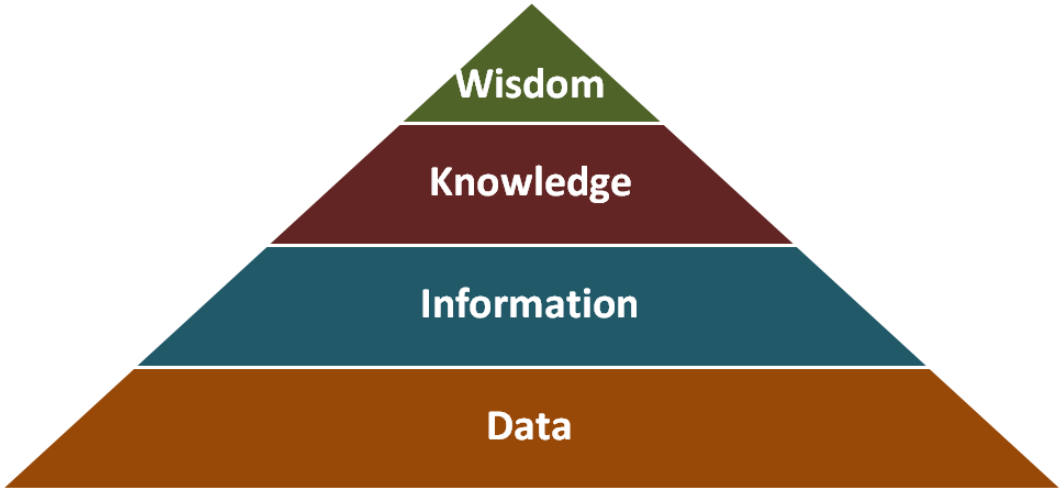

Figure 5. DIKW hierarchy or DIKW pyramid (Frické, 2007)

Firstly, data are products of observation. They are symbols that represent properties of objects, events and their environments (Ackoff, 1989). According to Ackoff (1988), observation refers sense and the technology and instrumentation for sensing are developed. Data can be acquired and generalized well by automatic instruments. It can be described as a series of meaningless outputs from any operation. (Ahmed, Lim, & Loh, 2002) For example, when a person fills in a form giving the name, address, age and social security number, all these information mentioned are treated as data. (Frické, 2007)

Secondly, information systems generate, store, retrieve and process data. In many cases, these processes are statistical or arithmetical (Ackoff, 1989). According to Frické (2007), information is a subset of data. It is data that arranged in meaningful patterns (Ahmed, Lim, & Loh, 2002) and is a group of data which is placed in a context and produces valuable outputs (Frické, 2007). Information changes something to be the reasons for actions, or makes somebody capable of different or more effective actions. (Drucker, 1989)

Finally, knowledge involves the individual, combining the personal experience, skills, intuition, ideas, judgments, context, motivations and interpretation. It includes integrating elements of both thinking and feeling. (Ahmed, Lim, & Loh, 2002) Rather than knowledge understood in the general sense of know-that, users at the level of knowledge often interpret and analyze knowledge as know-how. It is

suggested by Ackoff (1988) that know-how allows an agent to improve information to a controlling role that converts information into instructions. (Frické, 2007) Ahmed et al (2002) suggest that knowledge is intangible and personal resource in nature, whereas information is tangible and available to anyone who cares and tries to seek it out. However, both of them are more valuable than data.

Knowledge is based on the information individual possessed. It exits in individual's subjective context of action. It has various forms, which makes it creative, dynamic and adaptable. Some of knowledge is robust and well established. They are always based on organizational principles those have been tested over time and found to be true. Other knowledge may be dynamic and constantly. They are always shaped by new experiences and insights. (Debowski, 2006) According to Debowski (2006), knowledge develops through the adaption and interpretation of information, past expertise, experiences, errors and other influences. It takes advantages of personal construction of reality of individuals. Through further exposure and experiences, it would be reshaped and consolidated. There are two categories of knowledge which divide it into two different levels in work: explicit and tacit knowledge.

According to Hislop (2009), explicit knowledge is codifiable, objective, impersonal, context independent, and easy to share. Explicit knowledge is knowledge that can be shared with others, and can be codified and digitized in books, documents, reports, white papers, spreadsheets, memos, and training courses (Awad & Ghaziri, 2004). It is possible to be documented, categorized, and transmitted to others, and be easily shown to others through demonstrations, explanations and other types of sharing (Debowski, 2006). Compared to tacit knowledge, it is much easier to be identified, retrieved and transmitted, because it acts as a physical entity that is possible to be measured and distributed,. It can even be stored as a written procedure or a process in computers. (Awad & Ghaziri, 2004)

In contract, tacit knowledge refers to the knowledge embedded in the human mind through experience and jobs. It includes intuitions, values and beliefs which can be achieved from the years of experience. It is used to create explicit knowledge and is the knowledge best communicated personally through dialogues and scenarios. (Awad & Ghaziri, 2004) Being different from explicit knowledge, tacit knowledge is difficult for people to explain, duplicate, replace, interpret, describe and share (Debowski, 2006). According to Hislop (2009), it is the knowledge that people possess and inexpressible which is defined as personal, subjective (Hey, 2004) and context specific.

It is proposed by Nonaka (1995) that tacit knowledge and explicit knowledge can be created and transferred between each other. The details of this transformation process will be discussed following in the field of knowledge management process.

However, while Nonaka (1995) argues that knowledge exists only at individual level, there are other still researchers who keep different viewpoints. They argue that although much knowledge exists at individual level, there is other knowledge embedded in social groups. They exist in the forms of shared work practices and routines, and shared assumptions or perspectives. (Hislop, 2009) Thus, knowledge assets involve the knowledge at both individual and group level.

According to Hislop (2009), one of the most well known advocates of such a perspective is Spender (1996), combining the tacit-explicit dichotomy, with the individual-group dichotomy to create four generic types of knowledge in a two by two matrix as Figure 6.

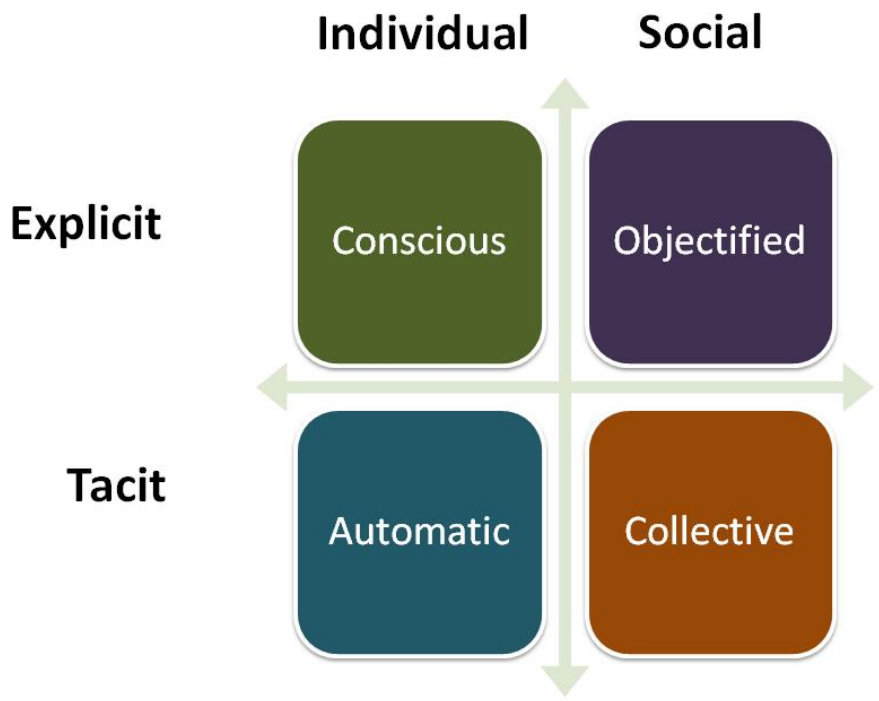

Figure 6. Generic knowledge types (Hislop, 2009)

Objectified knowledge refers to the explicit knowledge of groups. For example, a documented system of rules, operating procedures, and formulated organizational routines. Collective knowledge is tacit knowledge of groups. However, it is not codified or formally possessed by a group. For example, the informal rules of an organization, the ways of working, and the stories or the system of understanding shared in a group. (Hislop, 2009)

According to previous introduction, the characteristics of knowledge assets can be concluded and demonstrated as shown in Table 4.

Table 4. Characteristics of knowledge assets

Characteristics of knowledge assets	Creative (Debowski, 2006)
	Skills level (Frické, 2007) and know-how level (Ackoff, 1989)
	'Sticky' in human's mind (Ahmed, Lim, & Loh, 2002) and subjective (Hey, 2004)
	Intangible (Hislop, 2009)
	Dynamic (Debowski, 2006) and constantly changing (Ahmed, Lim, & Loh, 2002)
	Need for refreshment (Ahmed, Lim, & Loh, 2002)
	Being converted between tacit and explicit forms (Nonaka & Takeuchi, 1995)
	Existing at both individual and group level (Spender, 1996)

3.1.3 ICT IN KNOWLEDGE MANAGEMENT

To take advantage of such kind of knowledge assets, it is important to introduce and to understand the ICT used in knowledge management. ICT is changing quickly, shortening its life cycle and speeding its obsoleteness. It is considered to be the driving force of the long unprecedented economic growth period in the last decade. It provided the infrastructure for economic development, helped create the knowledge society, contributed to innovation and created value for the economy. More importantly, it improved the knowledge dissemination, accelerated research, stimulated innovation, and facilitated collaboration. This undoubtedly brought the world closer and together. (Ho, 2007)

In recent years, several researchers have associated knowledge management with the development of information and communication technologies such as Ruggles (1997), Scott (2000), and King (2005). (López, Peón, & Ordás, 2009) New technologies are characterized by the capability that how to impact the traditional understandings of certain phenomena and behaviors of organizations. Meanwhile, they are underlined by the capacity that how to influence the ways that organizations dealing with challenges occurring in knowledge society. (Duffy, 2001) Studies of the ICT have gone from the effects on economic-financial

variables to the complementarities with intangible resources such as knowledge. (Martin, Lycett, & Hatzakis, 2004)

According to López (2009), firms need internal information about their financial situation, the effectiveness of their products, and their production costs. Moreover, it is necessary for firms to get external information about the environment in which they operate, such as competitors, customers, and suppliers. This helps them get to know their customers and satisfy them immediately and effectively, and so gain sustainable competitive advantages. (Maier, Rainer, & Snyder, 1997) It is not enough to get information for organizations nowadays, but also obtaining quality information, where quality is measured in terms of accuracy, reliability, precision and timeliness. (Huber, 1990)

According to López et al (2009), IT competency is defined as that how firms use the technologies to manage information effectively. Being different from IT which refers to a generic term fundamentally used to programs, IT competency is broader, emphasizing using technologies to satisfy the demands and requirements of the firm's information. It differentiates between three dimensions of this concept (López, Peón, & Ordás, 2009):

- IT knowledge
- IT operations
- IT infrastructure

The above three concepts represent special assets and resources, which refers to the capacity of organization that how to understand and take advantage of tools to manage necessary information about markets and customers. (Tippins & Sohi, 2003)

Firstly, knowledge has a tacit component which is difficult to quantify, combined by information with experience, context, interpretation and reflection (Davenport, De Long, & Beers, 1998). Thus, technical knowledge is defined as principles and techniques that bring changes toward desired ends. Therefore, IT knowledge is defined as the extent to which an organization owns a body of technical knowledge about elements, for example, computer systems. (López, Peón, & Ordás, 2009) It refers to how a firm possesses a systematic, integrate and mature technical system which used for knowledge management.

Secondly, IT operation refers to the techniques, processes, tools and mathods relevant to IT demanded when the technologies are used to create value (Maier, Rainer, & Snyder, 1997). According to López et al (2009), it refers to the extent that an organization takes advantage of IT to improve the effectiveness and decision making. It is defined as the capacities that how a firm deal with businesses

by using tools and methods related to IT, enhancing its effectiveness in dairly businesses and even during decision making processes.

Thirdly, IT infrastructure, which may be the general understanding of IT competence, acting as an enabler who is responsible for the growing interest in the production and dissemination of information (Reardon, Hasty, & Coe, 1996). It involves in the tools, methods, artifacts and resources which contribute to and provide possibilities in acquisition, processes storage, dissemination and the use of information. (López, Peón, & Ordás, 2009) It should be the ones treated as the direct resources and elements relevant to IT in the daily life and businesses such as software, hardware and support staff.

According to López et al (2009), ICT provides the ways to improve efficiency of organization management processes and to enhance the capacity of response to environmental requirements. These technology systems offer a series of functions such as saving large amount of information, making it possible for individuals to access information, providing methods for communication, generating records of interactions and transactions, and automating processes.

From another point of view, it is necessary to understand how ICT works in the main processes of knowledge management. There are three key processes during knowledge management process as illustrated below (López, Peón, & Ordás, 2009):

- Knowledge generation
- Knowledge transfer
- Knowledge codification and storage

Knowledge generation is defined as the process which used in an organization to gain and obtain knowledge from either outside or inside. It aims at generating new knowledge or better knowledge than the existing one to improve the competitiveness of the firm. It refers to not only acquiring new knowledge, but also replacing, validating and updating the existing knowledge of the organization. In knowledge generation processes, information systems involve into two forms of capabilities (Mason, 1993): *in absorbing information from outside* and *in creating new knowledge*.

Firstly, organizations can obtain and generate knowledge externally from different sources such as talking to external agents, collaborators and partners, buying patents or talking on new employees. ICT is used in this point to help generating knowledge externally. Information is gathered from outside by IT methods from customers, suppliers or even competitors of a firm. For example, take advantage of the competitive intelligence systems to acquire information about other companies in the same industry (López, Peón, & Ordás, 2009).

Secondly, as illustrated in knowledge assets, new knowledge can be transferred, converted and created with experiences, existing knowledge or new information gained. Besides generating knowledge from outside, new knowledge can be created and existing knowledge can be replaced internally as well. Internally, knowledge creation involves developing new contents or replacing existing contents by various methods such as investing in R&D and training (Alavi & Leidner, 2001). To apply IT in this process, according to López (2009), new knowledge can be created from the reinterpretation and reformulation of existing and newly acquired information such as executive information systems and decision-support systems.

Besides, IT stimulates the process of knowledge transfer. In this process, knowledge is sheared in the organization among its units and members, promoting new understanding. (López, Peón, & Ordás, 2009) The interaction of information is required and highlighted in this process; thus, it is essential for the organization to develop a mature and systematic network for interaction of knowledge. It should be possible in this network that members with different backgrounds, culture, locations and skills can communication and share knowledge. It is highlighted that it is not enough just to offer possibilities of accessing the network for everyone, coming together through the network to undertake a particular project is significant as well. Moreover, according to López (2009), to transfer tacit knowledge, mechanism encouraging dialogue and interaction is required to develop. ICT can ensure the development of these functions. There are some methods of ICT and the examples of their corresponding functions used in businesses demonstrated in Table 5.

Table 5. ICT methods and corresponding functions in knowledge transfer

ICT methods in knowledge transfer	Corresponding functions
Remote-communication	Face to face meetings
Catalogue expertise of organizational members	Facilitate access to the right people and enhance knowledge sharing
Systems offering a virtual space	Participants process the information and knowledge in real time; thus gain more chance to interact
Exchange spaces	Develop innovative and creative behaviors around problems and situations

It is necessary to highlight one of the most important characteristics of the exchange spaces and virtual communities, which they are both founded on the base of democratization of knowledge. Thus, it is possible for them to enable the

occurrence of natural flows of transference and collaboration, and eventually stimulate creativity and innovation (Narayanan, 2001).

Moreover, ICT supports the process of knowledge codification and storage. It is illustrated and interpreted that knowledge can be codified and stored. Existing knowledge is suggested that must be captured, stored, codified, and presented in storage in a structured way, to make it possible for organizations to reuse in the future. Organizational knowledge is spread and dispersed throughout the firm not only in stores, but also can be found everywhere such as in different locations, individual's minds, organizational processes and culture, products and artifacts, procedures, disk and media. IT supports codifying, storing, capturing and presenting knowledge. It stimulates the standardization and automation of certain tasks, supporting tacit knowledge to be converted into explicit knowledge. (López, Peón, & Ordás, 2009) In order to get useful knowledge and to use knowledge correctly, it is necessary to ensure that each member in the organization can access and interpret the knowledge in a similar way. Thus, it is crucial to keep the knowledge stored and interpreted in a standard form which can be a part of the whole firm's knowledge base. According to López et al (2009), with protocols and platform standards, IT offers an ideal mechanism that connects widespread individuals through a common system. It enables members of the organization access knowledge more easily which is stored in memory bins, so that new knowledge can be interpreted and combined with the existing knowledge.

To conclude the role of ICT in knowledge management, there are two key points. Firstly, it is necessary to understand the competence of ICT and secondly, it is essential to figure out the application of ICT in knowledge management processes. It can be illustrated in Table 6.

Table 6. The role of ICT in knowledge management

ICT competence (López, Peón, & Ordás, 2009)		ICT in knowledge management processes	
IT knowledge	The extent to which an organization owns a body of technical knowledge about elements. • Computer systems	Knowledge generation (López, Peón, & Ordás, 2009)	Absorb information from outside (Mason, 1993). • Competitive intelligence systems Create new knowledge internally (Mason, 1993). • Executive information systems • Decision-support systems
IT operations	The extent that an organization takes advantage of IT to improve the effectiveness and decision making.	Knowledge transfer (López, Peón, & Ordás, 2009)	Access of knowledge, share and interaction of information, and mature mechanism which encourages dialogues and interactions. • Remote-communication • Catalogue expertise of organizational members • Virtual spaces • Exchange spaces
IT infrastructure	The tools, methods, artifacts and resources which contribute to and provide possibilities in acquisition, processes storage, dissemination and use of knowledge. • Software • Hardware • Support staff	Knowledge codification and storage (López, Peón, & Ordás, 2009)	Ensure each organizational member can access and interpret the knowledge in a similar way, and keep knowledge stored and interpreted in a standard form.

3.1.4 ORGANIZATIONAL CULTURE AND MEMBERS

In the definition of knowledge management, organizational culture and members play essential roles. This concept exactly refers to organizational culture and individual behavior, which are two main aspects of the field "people" of the key elements of knowledge management (Servin, 2005). According to Servin (2005), effective knowledge management requires a "knowledge sharing" organizational culture to be successful. It determines a set of values, beliefs, assumptions and attitudes that are deeply held by people in the organization, impacting the ways people behavior and the decisions made in the organization. In the organization focusing on individual achievement, it is usual that organizational members are rewarded for their individual knowledge. However, in organizations with knowledge sharing culture, people are not only rewarded for individual achievements, but also encouraged to share individual knowledge and rewarded for the knowledge sharing and contribution to team efforts. There are some essential characteristics of an organization with knowledge sharing culture.

Firstly, knowledge is treated as strategic asset by top leadership, and its development and exploitation are emphasized. Secondly, tools and processes to manage knowledge are defined clearly. In these processes, incentives and supports are offered. Thirdly, knowledge creation, sharing and utilization are treated as basic and natural parts of organization, instead of as normal work processes. Fourthly, collaboration and cooperation of groups inside organization are highlighted instead of competition. Evaluations of rewards and performance focus on the contribution to and use of organization's knowledge base. Finally, communication channels and technology infrastructures are set for enhancing knowledge management activities. Knowledge is accessible for every employee who can contribute to or use it. (Servin, 2005)

There are four cultural traits and values that are positively related to effectiveness (Daniel & Mishra, 1995):

- Involvement
- Consistency
- Adaptability
- Sense of mission

Firstly, involvement refers to that of a large number of participants. They are linked with effectiveness by providing a collective definition of behaviors, systems and meanings, which calls for individual conformity. According to Ahmed et al (2002), typically, this kind of involvement is obtained through integration around a small

number of key values. It creates a sense of ownership and responsibility, and is popularly recognized as a strong culture.

Secondly, there are both positive and negative impacts in “consistency”. It positively provides integration and coordination. However, the consistent cultures are always the most difficult barriers in change and adaptation

Thirdly, adaptability refers to the capacity for internal change in response to external conditions. It can be understood as the adaptability of an organization. Effective organization must develop the faiths and beliefs that support it to obtain the capability to gain and interpret the signals from the outside environment. It should own the capability to translate the signals into cognitive, behavioral and structural changes. (Ahmed, Lim, & Loh, 2002)

Finally, as Ahmed et al (2002) argues, the sense of mission can also be defined as the long-term vision. It seems to be the contrast concept with adaptability. It emphasizes the stability of the goal and central purpose and values of an organization, and ignores the adaptability and change in response to the outside environment and conditions.

It can be concluded that in these four cultural traits for organizational effectiveness, two contrasts can be found as shown in Figure 7.

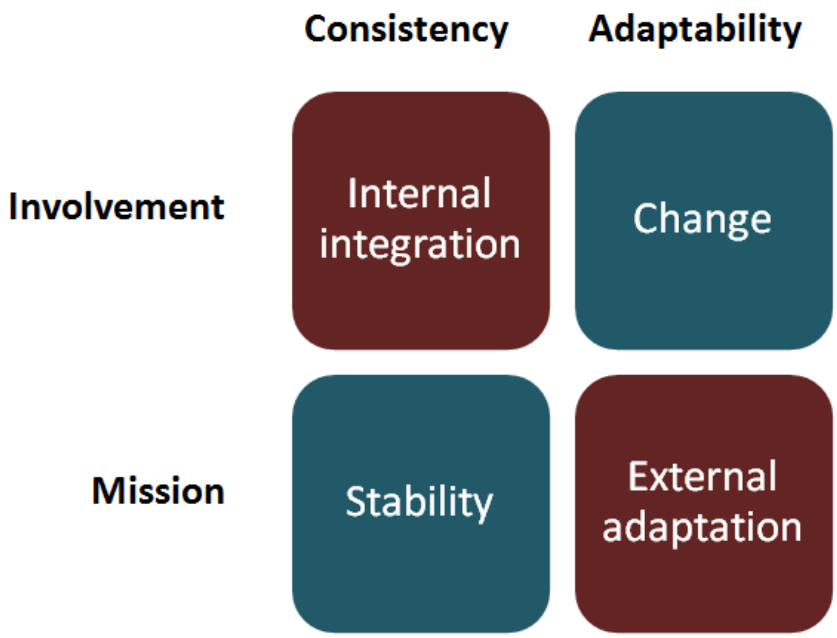

Figure 7. Four culture traits and two contrasts

It is illustrated that two contrasts gained from four cultural traits are: the *contrast between internal integration and external adaption*, and the *contrast between change and stability*.

Involvement and consistency focus on the dynamics of internal integration, while mission and adaptability emphasize the dynamics of external adaptation. Culture is developed when an organization coordinate and cope with the problems of external adaptation and internal integration (Schein, 1985). Involvement and adaptability address the capability of an organization to change, while mission and consistency highlight the importance of the stability of the organization.

However, it is necessary to know that changing existing organizational culture or establishing new organizational culture take a great deal of time and efforts. According to Servin (2005), directly taking on the entire organizational culture at on go is simply not feasible. Thus, besides of organizational culture, organizational members become another approach to adopt knowledge management. As introduced, it refers to individual behaviors in organization. When applying knowledge management as a new concept in an organization, it is a must to change individual behavior. Individuals should be encouraged to combine knowledge management into their daily routines such as figuring out knowledge when questions and problems occur, using and seeking out existing knowledge rather than reinvesting the wheel, sharing individual knowledge, learning from others' experience and helping others to learn from outside. (Servin, 2005)

Obviously, it is significant to find methods in motivation to individuals' behavior in learning and sharing knowledge. Thus, factors relevant to motivation, which are suggested as drivers of learning, sharing and creative production, should be highlighted. According to Ahmed et al (2002), there are three key factors:

- Intrinsic versus extrinsic motivation
- Challenges faced
- Skills and knowledge

Firstly, intrinsic refers to inherent and natural personalities. This is obviously a key driver of knowledge creation and sharing. Extrinsic interventions refer to rewards and evaluations. They may have adverse effects on knowledge creation and sharing motivation because they emphasize attention on following rules or technicalities of performing a certain mission, instead of 'experimenting'. (Ahmed, Lim, & Loh, 2002)

Secondly, it is suggested by Ahmed et al (2002) that higher learning and creativity would be stimulated by open-ended, non-structured tasks rather than narrow jobs. When individuals are provided with sufficient help and supports to generate creative solutions, creativity and knowledge learning and sharing would occur positively. Thus, usually, lack of creativity is not because of that individuals are lack of potentials in knowledge sharing and learning. It is due to that organization

is operating in a primary system that without strong effects on and encourages of individual's favor to share and transfer knowledge.

Thirdly, the creation and exploitation of knowledge are influenced by the relevant skills such as expertise, technical skills and talent. However, it is suggested by Ahmed (2002) that high domain-related skills have both positive and negative consequences. Positively, in-depth knowledge enhances the possibility of creating new understanding. It means that more knowledge gained, more possibilities of the new understanding may occur; then causes creativity and effective knowledge learning. Negatively, high-domain relevant skills narrow the search heuristics to learnt routines within functional departments. This fundamentally makes new perspectives and leads to functional 'fixedness' and a functional 'blindness'. (Ahmed, Lim, & Loh, 2002)

There is one thing more necessary to emphasize that with proper organizational atmosphere and culture, sources of obtaining knowledge are important as well. According to Ghaziri and Awad (2004), the ideal knowledge organization refers to the environment that people exchange knowledge across functional fields and departments via technology and established processes. With the organizational culture, employees should feel free to exchange their ideas and knowledge with trusts, producing knowledge assets through various technologies. In context of good organizational culture, there are several sources that knowledge organizations can derive knowledge from:

- Customer knowledge
- Product knowledge
- Financial knowledge
- Personnel practices knowledge

Firstly, customer knowledge refers to information of customers such as the targeted customers, the needs of them and customer buying power. Secondly, product knowledge includes knowledge that the products in the market place, the buyers of these products, the prices of them, and the amount of money spent on them. Thirdly, financial knowledge means capital resources, the methods and costs to acquire capital, and the integrating in financial practices. Finally, personnel practices knowledge involves available expertise, the quality service they provide, and the ways to find experts, especially in customer service. (Awad & Ghaziri, 2004)

To conclude the organizational culture and members, as shown in Table 7, it is necessary to understand that this concept refers to organizational culture and individual behaviors, which are in response to the element 'people' of knowledge management (Servin, 2005). There are four cultural traits in organizational culture,

which lead to two contrasts. In motivation and encourage of individual behaviors, there are three key factors treated as drivers.

Table 7. Organizational culture and members

Organizational culture and members	
Organizational culture (Servin, 2005)	Individual behaviors (Servin, 2005)
• Involvement • Consistency • Adaptability • Sense of mission (Daniel & Mishra, 1995)	• Intrinsic versus extrinsic motivation • Challenges faced • Skills and knowledge (Ahmed, Lim, & Loh, 2002)
• The contrast between internal integration and external adaptation • The contrast between change and stability (Ahmed, Lim, & Loh, 2002)	

3.1.5 ORGANIZATIONAL PROCESS

In the definition of knowledge management, according to Servin (2005), organizational process refers to organization's general infrastructure and processes, which shows people the ways of doing things. Meanwhile, it also points out the extent to which these ways act as enablers or barriers of good knowledge management practice. It is suggested by Servin (2005) that each organization has a structure and process which operate at different levels. Examples of the levels are illustrated in Table 8.

Table 8. Examples of different levels organizational processes operate at

Examples of levels (Servin, 2005)	The buildings and geographical location in which people work
	The way organization divided into departments and functions
	How people are organized into hierarchies and the relationships between them
	The way resources allocated – finances, technology, equipment

In Table 8, each of these listed examples and types of structure has an impact on how knowledge is created, shared and used in an organization (Servin, 2005). Moreover, it is suggested that organizational processes can be further divided into three subcategories (Garvin, 1993):

- Work processes
- Behavioral processes
- Change and learning processes

Firstly, the primary function of work processes is to accomplish tasks. It is a principle that all the tasks must be completed through linked chains of activities cutting across departments and functional groups. These chains are called work processes and can be subcategorized into two aspects (Ahmed, Lim, & Loh, 2002): operational processes and administrative processes.

Operational processes refer the processes that create, produce, and deliver services and products that customer demands. These processes are common in firms such as new product development, manufacturing, and logistics and distribution. *Administrative processes* are those necessary for running businesses but not for directly produce outputs such as strategic planning, budgeting, and performance measurement. Operational processes offer the products and services external customers demand, while administrative processes generate information and contribute to plans that internal groups and processes require. Thus, they are obviously not separate parts but dependent and relevant activities. In order to make the organization perform effectively, it is necessary to ensure these two processes aligned and mutually supportive.

Secondly, behavior processes refer to those capture patterns and features of the methods of acting and interacting of the organization. According to Ahmed et al (2002), they represent the organization's ingrained behavior such as decision-making and communication processes. The underlying patterns are embedded so deeply in the organization that almost all the organizational members display these patterns. It is even difficult for organizational members to recognize that they are performing the underlying patterns. There are three most important behavioral processes (Ahmed, Lim, & Loh, 2002): decision-making processes, communication processes, and individual learning processes

The feature of behavioral processes, more importantly, are embedded permanently in all processes, which makes them do not possess an independent existence. They are the generalized patterns of the accepted ways of doing things, forming a collection, movement and interpretation of information, through people (Ahmed, Lim, & Loh, 2002). It determines that how organizational members interpret and

understand information collected, and how they make decisions according to that. According to Ahmed et al (2002), mostly, in many cases, behavioral processes define behaviors that are learnt informally through socialization and on-the-job experience, capturing cognitive and interpersonal aspects of the work. These underlying patterns always determine the effectiveness of a company and eventually decide the success of it. For example, even though it may be the same in product development processes in different companies, the different decision-making processes and communication processes may lead to the effectiveness and final success of the companies.

Finally, organizational change and learning processes play another crucial role in organizational processes. To struggle in long-term organizational survival, according to Ahmed et al (2002), organizational learning is an important aspect, which is based on the share of knowledge and involves the creation and acquisition of knowledge.

To conclude the main understanding of organizational processes, as shown in Table 9, three key categories of organizational processes are illustrated with detail understandings and subcategories in response to each of them. Each of these processes plays a core role in knowledge management of organization.

Table 9. Three key categories of organizational processes

Work processes (Garvin, 1993)	Behavioral processes (Garvin, 1993)	Change and learning processes (Garvin, 1993)
• Operational processes: processes directly related to producing products and services • Administrative processes: supportive and administrative activities necessary for running business but not directly relevant to producing products and services (Ahmed, Lim, & Loh, 2002)	• Decision-making processes • Communication processes • Individual learning processes (Ahmed, Lim, & Loh, 2002)	• Share of knowledge • Creation and acquisition of knowledge (Ahmed, Lim, & Loh, 2002)

With the understanding of the definition of knowledge management, it is now easy to understand how organization identify, capture, organize and take advantage of

knowledge assets, through ICT, organizational culture and individual behaviors, and organizational processes.

3.2 KNOWLEDGE MANAGEMENT PRACTICES

As the definition introduced previously, knowledge management refers to the process of identifying, capturing, organizing, and taking advantages of intellectual assets of the organization, via the use of particular types of ICT, organizational culture and members, and organizational processes. It is operated as the entire set of practices and activities involved in manipulating and managing the stocks and flows of knowledge in the firm, starting from how knowledge is created to how it is harvested, stored, applied and reused in new and related situations (Li, Tarafdar, & Rao, 2012). Thus, knowledge management practices refer to the set of practices those applied in knowledge management of firms. They refer to those practices which are either explicitly intended to perform some knowledge management function, or some practices in other functions which are convinced to additionally have knowledge management dimensions, such as writing a report for one's line manager (Hull, 2007). In this thesis, the categories, strategy and process will be introduced, from different perspectives of researchers.

3.2.1 CATEGORIES OF KNOWLEDGE MANAGEMENT

Knowledge management practices are categorized into different set of areas, from different perspectives, emphasizing various key aspects. For example, in the perspective of R&D of organization, there are five main groups of knowledge management practices according to Hull (2007), corresponding to the areas where knowledge management practices are most influential:

- R&D management
- 'Mapping' knowledge relationships
- R&D human resource management
- Managing intellectual property positions
- R&D information technology management

Firstly, the knowledge management practices relevant to R&D management often have other primary purpose, and are found to varying degrees in all R&D and innovation environments. These practices are growing directly out of the performance of R&D work itself and are shown typically in the R&D scientists, even in their formal and informal communication patterns within and out of the lab. For example, personnel from different departments who work on an R&D project are located in the same physical place to help develop new domains of expertise, as well as to implement project more efficiently. (Hull, 2007)

Secondly, mapping knowledge relationships plays another significant role in knowledge management practices. According to Hull (2007), R&D of organizations are typically are based on project teams and on the departments with special technical expertise. Usually, theses two reference points of organizations would form the two sides of the matrix in a matrix management structure. For example, a picture of the technology portfolio of an R&D lab is mapped according to the requirements of the internal divisions which are its potential customers, as well as the product portfolio of the firm is mapped on to the trend of the end-user market.

Thirdly, R&D human resource management refers to the set of knowledge management practices, which is concerned relevant to motivating and rewarding R&D employees. Hull (2007) emphasizes that to quite different degrees, these knowledge management practices are tied closely to the broader corporate human resource management policies such as training and career development activities. However, because of the particularity of the property of R&D, there may often be conflicts between corporate and R&D human resource management. Indeed, some R&D units may particularly pay attention to the activities designed to encourage knowledge sharing, the improvement of interdisciplinary expertise, and cross-boundary working.

Fourthly, according to Hull (2007), in-house intellectual property rights (IPR) experts in R&D labs are becoming more proactive, and this circumstance is strongly influenced by several knowledge management practices in the field of IPR. Instead of principally providing a service to formulate patent applications and to maintain patents, information of competitors' patent activity is more frequently to be distributed to R&D teams actively by these experts. Commentary on its implications is also provided for the strategic direction and detail of the company's own R&D. It is mentioned by Hull (2007) that a second major knowledge management practice in this group is the early involvement of IPR staff with R&D teams, which is to formulate the IPR dimensions of emergent instances of novel technology. The distinguishing feature of this practice is that IPR expertise is used to focus on the direction of R&D technical activity in mid-project.

Finally, information technology applications can be a crucial enabler of the emergence of new knowledge management practices. Additionally, it is emphasized that distinction need to be made between cases where IT supports a knowledge management practice with a strong independent existence and cases those where IT provides the trigger to create or change a knowledge management practice. (Hull, 2007)

3.2.2 STRATEGY OF KNOWLEDGE MANAGEMENT

To manage knowledge into the organization, it is significant to develop a proper knowledge management strategy, as well as systematic process of knowledge management (Dalkir, 2005). From a strategic viewpoint, for academics and practitioners, there are two types of knowledge management contributions (Grant, 2002). On the one hand, two existing kinds of knowledge – explicit and tacit – are considered as a contribution with different characteristics and organizational implications for the firm. On the other hand, the processes of knowledge management those focus on generating and exploiting knowledge are significant as well, which is introduced following.

Knowledge plays the role as firm's main strategic resources. When it is effectively managed, it allows organization to achieve and maintain the competitive advantage. (Donate & Guadamillas, 2011) In this context, a knowledge management strategy focuses on the knowledge requirements of the firm, which is relevant to the application of its business strategy (Zack, 1999). According to Zack (1999), with the environmental condition of how the company's business activities are developed, these requirements of knowledge management strategy are established by identifying, assessing and mapping the knowledge assets of the company.

To implement and to support knowledge management strategies and initiatives in the company, it is necessary to pay attention to the infrastructures such as information technology systems and the human factor (Donate & Guadamillas, 2011). On the one hand, technological infrastructures are IT applications and systems those help organizations gather, structure, access, transfer and apply explicit knowledge through integrative applications, and assist individuals in conversion between explicit and tacit knowledge (Zack, 1999). On the other hand, human infrastructures can be seen as support tools or practices that companies use to commit employees to ensure the implementation of knowledge management strategies, such as evaluation of knowledge management performance and employee trainings in specific knowledge management tasks.

Moreover, knowledge management strategy provides the basic building blocks used to achieve organizational learning and continuous improvement. A knowledge management strategy is defined as a general, issue-based approach to defining operational strategy and objectives with specialized knowledge management principles and approaches. (Dalkir, 2005) Once this fundamental strategy is decided, baseline and technology options may be explored. (Sailwal, 2009) According to Sailwal (2009), here are two main knowledge management strategies (Hansen, Nohria, & Tierney, 1999):

- Codification
- Personalization

Codification strategy aims to capture and codify knowledge in explicit form such as in documents and databases, and to make sure that these are available to everyone in the organization for further reuse. It can be a good strategy to store large amounts of knowledge and to create an organizational memory for all employees (Boh, 2007). Under codification strategy, organizations invest once in the development of explicit knowledge and store it, and are able to reuse it whenever required (Scheepers, Venkitachalam, & Gibbs, 2004). According to Hansen (1999), when an organization provides a standard product or solution to its clients, it would be helpful with a codification strategy which leverages the ability to reuse the organization's knowledge. However, there is still weakness of codification strategy that it typically does not provide a rich medium for communication. According to Boh, the richness of a communication is usually measured by bandwidth where the amount of information exchanged between parties, the degree of customization that if the information can be selected, restructured and provided to specific user demands, and the degree of interactivity to ensure that both parties can involve in repeated exchanges.

Personalization strategy, according to Hansen (1999), focuses on the interpersonal relationships to mobilize and share knowledge in tacit form across the organization. Instead of storing information and knowledge explicitly, it is the knowledge management strategy which links people to each other to cultivate person-to-person sharing of knowledge. With this strategy, organizations tend to create and stimulate networks between people in order to share and study their individual skills, experiences and expertise (Scheepers, Venkitachalam, & Gibbs, 2004). According to Hansen (1999), when organizations tackling problems without standard and clear solutions at the outset, it would be beneficial to take advantage of personalization strategies, allowing the employees all involved in discussions to figure out a highly customized solution to each unique problem. On the contrary to codification strategy, as treating people as a mechanism for sharing knowledge, personalization strategy provides a rich medium for communication. In this strategy, individuals, who generate knowledge that largely remains in their heads, are treated as effective carriers of knowledge and information because they can restructure information so that it can be applied into a new context. According to Boh (2007), however, in this strategy, there are still costs and risks for knowledge-seekers and knowledge-providers. For example, admitting ignorance on a given topic may be one of the risks in the process of seeking knowledge. When seeking information from others in organizational settings, some other individuals may perceive the information being looked for, leading to risks. Additionally, knowledge sharing requires particular environment that knowledge-seeker is aware of what others know, when is possible

to access the knowledge-provider, and if the knowledge-provider is willing to share knowledge with the seeker. (Boh, 2007)

3.2.3 Process of Knowledge Management

In addition to knowledge management strategy, process of knowledge management is significant in knowledge management practices as well. As illustrated in Chapter 3.1.2 that knowledge could be divided into two categories: explicit knowledge and tacit knowledge. They are pointed as two main types of human knowledge (Nonaka & Takeuchi, 1995), which can be transformed to create new knowledge (Hildreth & Kimble, 2002). According to Nonaka (1995), the process of transformation and creation between these two intellectual assets can be realized by Nonaka's model, as demonstrated in Figure 8.

Figure 8. Nonaka's spiral knowledge (Hildreth & Kimble, 2002)

According to Nonaka (1995), tacit and explicit knowledge are not separate ones, instead, they are mutually complementary entities. In the human beings' creative activities, there is interaction between them. This is called knowledge conversion process by Nonaka.

Firstly, socialization transfers tacit knowledge between individuals through observation, imitation and practice. Secondly, externalization translates tacit knowledge into explicit knowledge by analogy or metaphor, such as documents and procedures. It is always leaded by dialogues or collective reflection. Thirdly,

combination converts the bodies of explicit knowledge and spreads it throughout an organization. This step is always fulfilled through sorting, adding, combining, and categorizing processes. Finally, in internalization process, explicit knowledge is transferred into individual tacit knowledge. (Hildreth & Kimble, 2002) The integral process is called “knowledge spiral” by Nonaka (1995). This process makes the creation and sharing of knowledge a part of organizational culture.

Knowledge management process aims to support innovation and to encourage the free flow of ideas through the company (Danijela, 2011). On the one hand, it speeds up the delivery of products and services to market, which increases revenues. On the other hand, it eliminates redundant and unnecessary business processes, which reduces costs. It increases the time employees spending in the company, since their knowledge and efforts are valued by the system of rewards, which leads to the increase of company’s value and competitiveness, the efficiency and effectiveness, and the relationship of all resources and innovation. (Tisen, Andriessen, & Lekan, 2006)

Meanwhile, there are many perspectives of knowledge management process from other researchers. In this thesis, these perspectives will be compared with processes of spiral model. From a general perspective, knowledge management practice can be divided into three processes: knowledge obtaining, knowledge organizing, and knowledge applying (Niu, 2010), as shown in Figure 9. Compared with spiral model, knowledge obtaining process includes socialization and externalization. Knowledge organizing process and knowledge applying process are respectively as the same as combination and internalization.

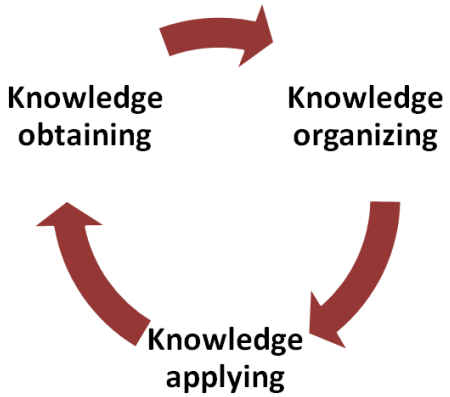

Figure 9. Knowledge management process of Niu (2010)

According to Niu (2010), from intuiting and interpreting to integrating and institutionalizing, the first two processes of knowledge management can consequently defined as obtaining and organizing. Firstly, knowledge obtaining includes two aspects: knowledge acquisition and knowledge creation

These two processes respectively represent creating knowledge inside a company or acquiring it from external sources (Duffy, The KM technology infrastructure, 2000). It is suggested that the creation and acquisition of new knowledge both positively depends on organizational adaptation. They may be required either when existing knowledge is obsolete to solve problems or when it is necessary for the emergency of new knowledge. *In knowledge acquisition*, organizations attempt to identify outstanding practices of competitors and partners, comparing with the state of the current particular processes to figure out the gap and problems in design. With these differences and gaps identified, organizations can capture the knowledge for internal use to improve performance (Mu, Love, & Peng, 2008). Absorptive ability is proposed to evaluate the ability of an organization in integrating and replicating knowledge derived from external sources. It stimulates organizations to accumulate and renew the existing knowledge, and then contribute to innovations. *In knowledge creation process*, tacit nature of knowledge is highlighted, inside the minds of individuals and groups in the organization. According to Niu (2010), transformational process of tacit knowledge to explicit knowledge is utilized to enhance the applicability of more codified knowledge. Thus, diverse approaches are used to create new knowledge inside organization such as collaboration between employees, multi-unit project teams and R&D department. Besides, in order to ensure the transformational process of tacit knowledge and explicit knowledge, Nonaka's spiral knowledge model is used.

Secondly, after obtaining, knowledge organizing acts as an initial filtering mechanism. The potential payoff of newly obtained knowledge is required to be examined and identified, and the unnecessarily valueless knowledge absorbed should be prevented. In the stage of knowledge organizing, there are three processes: knowledge refining, knowledge storing, and knowledge sharing.

Firstly, *knowledge refining* is a value adding process consists of labeling, cleaning, standardizing and abstracting the knowledge platform for reviewers to easily examine and search. It can enhance the effectiveness and efficiency of organizational knowledge management.

Secondly, *knowledge storing* refers to the approaches acting as bridges between knowledge obtaining and knowledge sharing such as databases and data warehousing. It is suggested that the structure of knowledge storage should be contain multiple content views so that users with diverse contextual needs can examine stored knowledge. Besides, if managed properly, the content of the knowledge storage can extend and grow over time. Knowledge storing creates an accessible platform with internal sources for users to search knowledge according to their own requirements, and fits their needs best, which will eventually stimulate organizations to adapt to the environment changes better.

Thirdly, *knowledge sharing* refers to the approaches which delivery knowledge to users, groups and organizations (Pfeffer. & Sutton, 2000). It is usually mediated by organizational culture and frequency of communication (Buckman, 1998). According to Huber (1991), employees acting as knowledge acquirers also communicate and share knowledge to other organizational components. It is not uncommon that communication and share of knowledge should be across departments and functions inside organizations, to make information and knowledge easier for users to search and reuse.

Finally, knowledge applying refers to the actual use of knowledge. It focuses on the theoretical structures and practical applications of knowledge, acting as the last phase of the processes of knowledge management practices. With a better performance and application of knowledge in this process, organizational performance can definitely benefit a lot from the whole knowledge management processes.

Similarly, four processes of knowledge management practices are proposed by Li et al (2012) and illustrated in Figure 10.

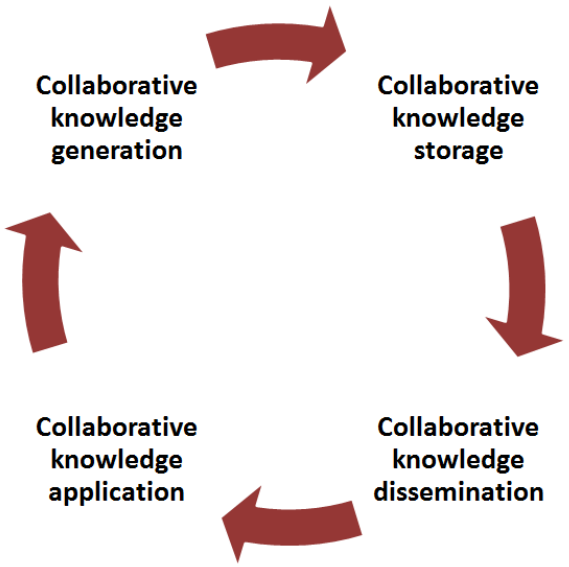

Figure 10. Knowledge management process of Li et al (2012)

Compared with spiral model, collaborative knowledge generation plays the same role as socialization and externalization. Collaborative knowledge storage and dissemination process include the same function of combination, and collaborative knowledge application is as same as internalization.

The two approaches of obtaining knowledge including creating internally and acquiring from outside are highlighted in collaborative knowledge generation, as the same as it claimed by Niu (2010). The second process consists of identification, evaluation, and capture relevant and valuable knowledge. Knowledge dissemination

is as almost the same as knowledge sharing, adding encouragement, efforts and supports of communication and share of knowledge. The differences and similarities are shown in Table 10 as a comparison.

Table 10. Comparison of arguments of KM processes among Nonaka (1995), Niu (2010) and Li et al (2012)

Nonaka (1995)	Niu (2010)	Li et al (2012)
Socialization	Knowledge obtaining	Collaborative knowledge generation
Externalization		
Combination	Knowledge organizing	Collaborative knowledge storage
		Collaborative knowledge dissemination
Internalization	Knowledge applying	Collaborative knowledge application

Despite of the three processes of Nonaka (1995), Niu (2010), and Li et al (2012), there are some other view points of knowledge management process. From the perspectives of main abilities of organization to fulfill successful knowledge management practices, the process can be divided according to the four main abilities (Danijela, 2011) in Figure 11.

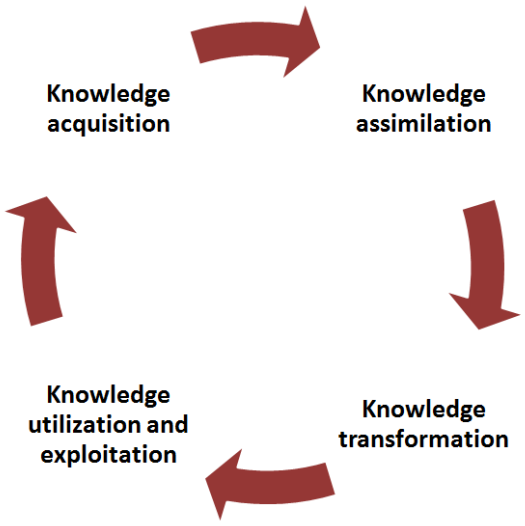

Figure 11. Knowledge management process of Danijela (2011)

According to Danijela (2011), firstly, knowledge acquisition refers to the creation of knowledge, which involves market research, product, services and process research and development, and strategic partnerships. Secondly, knowledge assimilation aims at using the knowledge in the right way, trying to reduce the gap between the knowledge needed and the knowledge available currently. Thirdly, knowledge transformation emphasizes on the ability combining elements of knowledge in new

ways, and gathering a set of knowledge which are previously segmented and disjointed. The goal of knowledge transformation is to create an entirely new knowledge, offering fresh ideas to the further application of knowledge and new solutions of the market needs. The connection between assimilation and transformation of knowledge is highlighted, because the better assimilation of knowledge is, the more effective the transformation would be (Swan, Newell, Scarborough, & Hislop, 1999). Finally, knowledge utilization and exploitation refers to the ability of company to incorporate knowledge into its business processes. It is reflected in how, when and where the knowledge can be used to fulfill market needs. (Danijela, 2011)

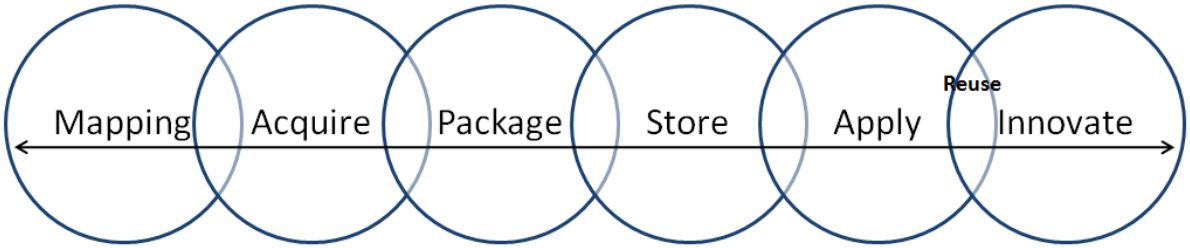

Figure 12. A knowledge management event chain

However, there is still other perspectives exist. As shown in Figure 12, knowledge management can be analyzed by using an event chain which consists of six key processes in knowledge management practices according to the chain through time (Despres & Chauvel, 1999):

Firstly, mapping of knowledge management refers to the world of business intelligence and perception. It emphasizes the individuals and organizations function within information environments of their own making.

Secondly, acquire knowledge, which can also be defined as capture or create of knowledge, points to the world of research, development and creation of knowledge. According to Despres and Chauvel (1999), from the information environments, information is appropriated and elements those are judged valuable are combined. In this process, feedback and feed forward loops are with the Mapping phase, because most of what people search for at Time1 is what they expected to find at Time2.

Thirdly, package refers to the world of codification and representation. On the one hand, it involves the media which can bundle information such as paper, electronic and voice. On the other hand, it is more important to realize the significance of

codification and representation. Information should be codified by the author once it needs to be transmitted, followed by a representation launched into a public space such as characters on a page, numbers, maps and balance sheets. This process is usually founded in the semantics and semiotics in communication. (Despres & Chauvel, 1999)

Fourthly, store of knowledge focuses on the world of databases, info bases, knowledge bases, and memory. In this step, individuals and organizations store information in memory systems of various kinds, ranging from synaptic response in the brain, to hard disks, libraries, and data warehouses. According to Despres and Chauvel (1999), the identification and retrieval protocols relevant to the stored information should be viewed significant as well. There may be little benefits can be derived from information stored; however, it still cannot be accessed.

Fifthly, knowledge application, which is also viewed as knowledge share or knowledge transformation, refers to the world of competencies, teamwork, intranets and cross-border sharing. In this process, it is highlighted by Despres and Chauvel (1999) that the field of knowledge management recognizes that information is inherently social, so that knowledge must be communicated. It is the beginning to prove that the value of knowledge is known only through action.

Finally, following the application, share and transformation of knowledge, information can be reused in the business processes, and then involves innovation and evolvement. It is crucial to recognize that knowledge must evolve in step with the changes of the surrounding and relevant environment, otherwise it risks losing its value. For example, product development programs building on experiences in the marketplace, R&D processes which make a basic science adapted to product needs, and creativity processes those broaden the intellectual horizons.

Addition to all mentioned previously, Li and Yang (2000) have proposed five knowledge processes. They are shown in Figure 13.

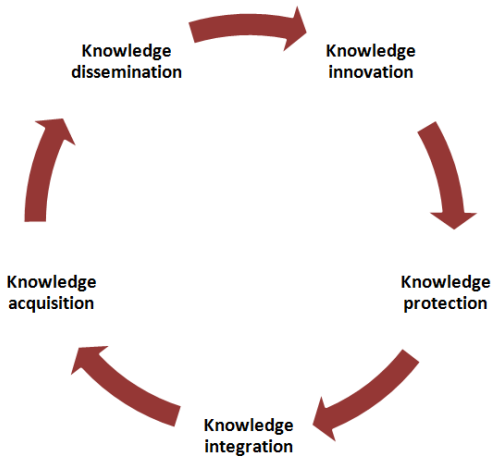

Figure 13. Knowledge management process of Li and Yang (2000)

Similarly, knowledge acquisition, knowledge innovation and knowledge integration are combined by Alavi and Leidner (2011) into one single process, which is named as knowledge creation. As shown in Figure 14, five processes of knowledge management cited by Li and Yang (2000) are converted into three.

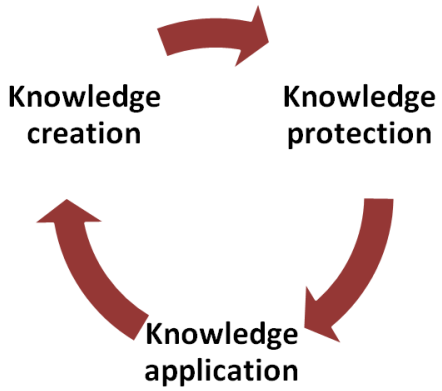

Figure 14. Knowledge management process of Alavi and Leidner (2011)

To conclude the processes of knowledge management, Table 11 is provided with diverse perspectives of different researchers. Illustrating the arguments of various researchers, comparison is demonstrated in the structure of the table as well.

Table 11. Perspectives of KM process of different researchers

Nonaka (1995)	Socialization	Externalization	Combination	Internalization
Niu (2010)	Knowledge obtaining		Knowledge organizing	Knowledge applying
Li et al (2012)	Collaborative knowledge generation		Collaborative knowledge storage	Collaborative knowledge application
			Collaborative knowledge dissemination	
Danijela (2011)	Knowledge acquisition		Knowledge assimilation	Knowledge utilization and exploitation
			Knowledge transformation	
Despres & Chauvel (1999)	Mapping		Package	Apply
	Acquire		Store	Innovate
Alavi & Leidner (2011)	Knowledge creation		Knowledge protection	Knowledge application
Li & Yang (2000)	Knowledge acquisition		Knowledge protection	
	Knowledge integration		Knowledge dissemination	
	Knowledge innovation			

3.3 Knowledge Management in Large Enterprises

3.3.1 Current System

To make sure knowledge management successful in large enterprises, it is significant to understand current system of knowledge management and its implementation. Thus, the most common and used instruments need to be considered whether they are at the satisfied level and have high impacts (Mertins, Heisig, & Jens, 2003). With large amount of investigations, two key enablers for knowledge management in current system of large enterprises are introduced by Mertins et al (2003):

- IT support
- Communities of Practice

It is interesting mentioned in book of Mertins et al (2003) that some other people argue IT supports are usually considered not key part of knowledge management. These perspectives are proposed as “IT is not the most important enabler but at the same time we cannot live without it”. However, as mentioned previously in the definition of knowledge management, particular types of ICT are emphasized in this thesis as key instruments in knowledge management. Thus, as same as perspective of Mertins et al (2003), this thesis highlights the importance of IT tools. There are so many tools in IT support than expected but not enough. It is usually determined by commitment and culture that whether IT tools work and whether they provide expected functions and results (Mertins, Heisig, & Jens, 2003). According to Mertins (2003), most used IT-tools are provided:

- Intranet with email and discussion forms
- Intranet with document management functionalities
- Intranet with people finding functionalities
- Video-conferencing
- Tools for communities and project teams
- E-learning

And least used IT-tools in knowledge management are proposed (Mertins, Heisig, & Jens, 2003):

- Gaming and simulations
- Decision support tools
- Data or text mining tools
- Customer relationship management

To make sure that these IT-tools work and provide optimal results, it is necessary to train employees to get familiar with and professional in IT enablers. Managers cannot expect all employees use IT-tools in the best way without trainings. Motivation and encouragement for the use of IT-tools are highlighted as well. Employees should be motivated to take advantages of IT enablers to make their work and life easier and more convenient. Moreover, IT enablers should be involved and integrated in daily operations, which narrows the gap between daily work and IT-tools. It is difficult for employees to spend extra efforts for the use of IT-tools in daily work if the gap is too large. Meanwhile, some specific content are required to be added and updated such as yellow pages and personal home pages. These instruments work and be made use of only if the content is updated or provides benefits. (Mertins, Heisig, & Jens, 2003)

Some IT tools in detail for knowledge management are also suggested by Crosby (2008). They are illustrated in Figure 15.

Figure 15. Examples of IT tools for knowledge management

Document management is a key part of organizational management and most firms choose to use a Document Management System (DMS) in organizing and tracking of documents. It is mentioned by Crosby (2008) that working from folders on network may be efficient in some small enterprises but may cause problems in large ones. Most of the time, employees have own naming conventions in documents, which gives them difficulties in locating or operating documents in other peoples' collection.

According to Crosby (2008), intranet or secure webpage is now widely applied in large enterprises. Some enterprises have already switched intranet or secure webpage to a portal. Portal has the similar functions of intranet, and allows customization and access to all software applications from one site. Managing and updating these pages require lots of work, which is solved by content management systems. It shows that intranet and content management systems are applied mostly in large enterprises, because their setting up and maintenance require money, time and staff.

The concept of taxonomies comes from "taxonomy" in biology which refers to classification of living organisms such as class, family and species. In knowledge management, taxonomies are used in classifying things, especially usually in document management. Different forms are defined according to the philosophy of the organization, and documents can be arranged in different rules. For example,

documents can be grouped according to a list of key words such as type of content, geographic location and the subject of documents. (Crosby, 2008)

Email always causes problems in enterprises. As the volume of emails keeps increasing, it is necessary to make sure which ones are important and retained for future use, and which should be deleted. As suggested by Crosby (2008), it helps if setting firm-wide or practice-group specific retention policies. Meanwhile, it is significant to decide how to deal with messages to be retained. Individual messages stored in email software may be lost if emails are printed out. The ideal solution illustrated by Crosby (2008) is to make it possible to drag and drop messages into a folder, to automatically deal with information in the best way. This function has been already available in document management system Interwoven. Messages are added to the document management systems by dragging them into a folder. Meanwhile, relevant key information such as client and individual information would be added automatically to the document's profile.

Customer relationship management (CRM) would not be an unfamiliar concept. For large enterprises, clients and customers are significant and so as their contact information. However, it is usually difficult to know who knows the same person, who has useful contact information, or who can contact an important customer in a particular field. To solve these problems, customer relationship management systems is applied, pulling the contacts together. It allows tracking of contacts and recording crucial contact information for future use.

Search tools are common not only in large enterprises. They are widely utilized in life and businesses. However, some tools such as Google always find items that "good enough" but not the "best answer" (Crosby, 2008). It helps that some search tools show not only search results but also recommend relevant items that people may be interested in. For example, the popular search tools with this function for books include Amazon websites and for law firms include Recommind and Google Appliance.

In addition to IT-enablers, in the concept of knowledge management in this thesis, organizational processes are also important. Actually, IT tools and enablers are applied throughout the whole organizational processes. Despite of IT, Communities of Practice (CoP) are proposed by Mertins as another main enabler of knowledge management. As shown in Figure 16, the fields CoPs involved in knowledge management are illustrated.

Figure 16. The fields CoPs involved in knowledge management

It is emphasized that CoP is used by enterprises as the major tool to create knowledge sharing platforms. According to Mertins (2003), most people use CoPs to share knowledge and good practices, to solve problems, to create knowledge, and to achieve development of tools, methods and frameworks.

Mertins et al (2003) have made a survey among users of CoPs, and the result shows that 70% of the emergences of CoPs are caused by the need of both individual and enterprises. All respondents have the idea and goal that sharing knowledge and good practices. 75% of them use CoPs to solve problems, 65% of them to create knowledge, and 45% to develop tools, methods and framework.

From the perspective of enterprises, using CoPs for knowledge sharing and creation requires proper management and cultural changes. It is significant to create marketplace for communities, to ensure them operate as expected and to support users successfully collaborating, co-learning and sharing their knowledge. Meanwhile, illustrating the power of communities to members and managers are highlighted, as well as cross-department cooperation. Leading intranet only by IT department is not enough. The work and use of intranet has already been changed, which requires cross-department collaboration. This is the new way of behavior, and it is important to develop and create new spaces for employees working at shop floors. (Mertins, Heisig, & Jens, 2003)

Except IT tools and CoPs, cultural and motivational issues are highlighted in concept of knowledge management in this thesis. According to the survey's result of Mertins (2003), there are four common aspects of organizational culture which supports knowledge management, as demonstrated in Figure 17.

Figure 17. Highlighted fields of organizational culture in knowledge management

It is manifest that to make knowledge management successful, leaders' support and guide are necessary. Knowledge sharing is always voluntary, so it is impossible to force employees for sharing knowledge. It surely takes time for changes, thus patient and investment in creation are required. However, money is not the only way to motivate employees in knowledge contribution. Recognition and providing more challenges are highlighted to stimulate employees. (Mertins, Heisig, & Jens, 2003)

In this chapter, concept of knowledge management in this thesis is highlighted. The three main aspects are emphasized and explained in detail. Tools and methods in each aspect for knowledge management are showed. To conclude the content of this chapter, Table 12 is demonstrated. It shows the detailed tools and manners in three main aspects for knowledge management.

Table 12. Detailed tools and manners in three main aspects for knowledge management

Knowledge management refers to… …, via the use of particular types of ICT, organizational culture and members, and organizational processes. (Awad & Ghaziri, 2004) (Debowski, 2006) (Hislop, 2009)		
ICT	Organizational culture	Organizational processes
IT tools and enablers (Mertins, Heisig, & Jens, 2003)	Cultural and motivational issues (Crosby, 2008)	IT tools and CoPs (Mertins, Heisig, & Jens, 2003)
• Document management • Intranet • Content management • Taxonomies • Email • Customer relationship management • Enterprise search	• Interpersonal exchange, respect and trust • Lack hierarchy • Perceived urgency to change due to market environment • Highlight quality and customers	• Share knowledge and good practices • Solve problems • Create knowledge • Development of tools, methods and frameworks

3.3.2 Weaknesses in Current System

According to Sedera (2009), knowledge management is divided into four main processes:

- Knowledge creation
- Knowledge retention
- Knowledge transfer
- Application of knowledge

Surveys and analysis are done and got three hundred and nineteen responses from twenty-seven organizations by Sedera (2009). In knowledge creation processes, new knowledge is created to replace old ones. Large organizations obtain internal knowledge much more than small ones. Small ones always lack IT expertise. Knowledge retention processes refer to storage of knowledge, and this kind of ability of enterprises descend with declining organizational sizes. Knowledge transfer processes involve informal transfer and formal transfer. Informal transfer refers to activities such as meetings, informal gatherings and coffee break conversations. Formal transfer involves channels such as formal training programs. (Sedera, 2009) The final result of large enterprises in knowledge management process is shown in Figure 18. The numbers are scores got from analysis.

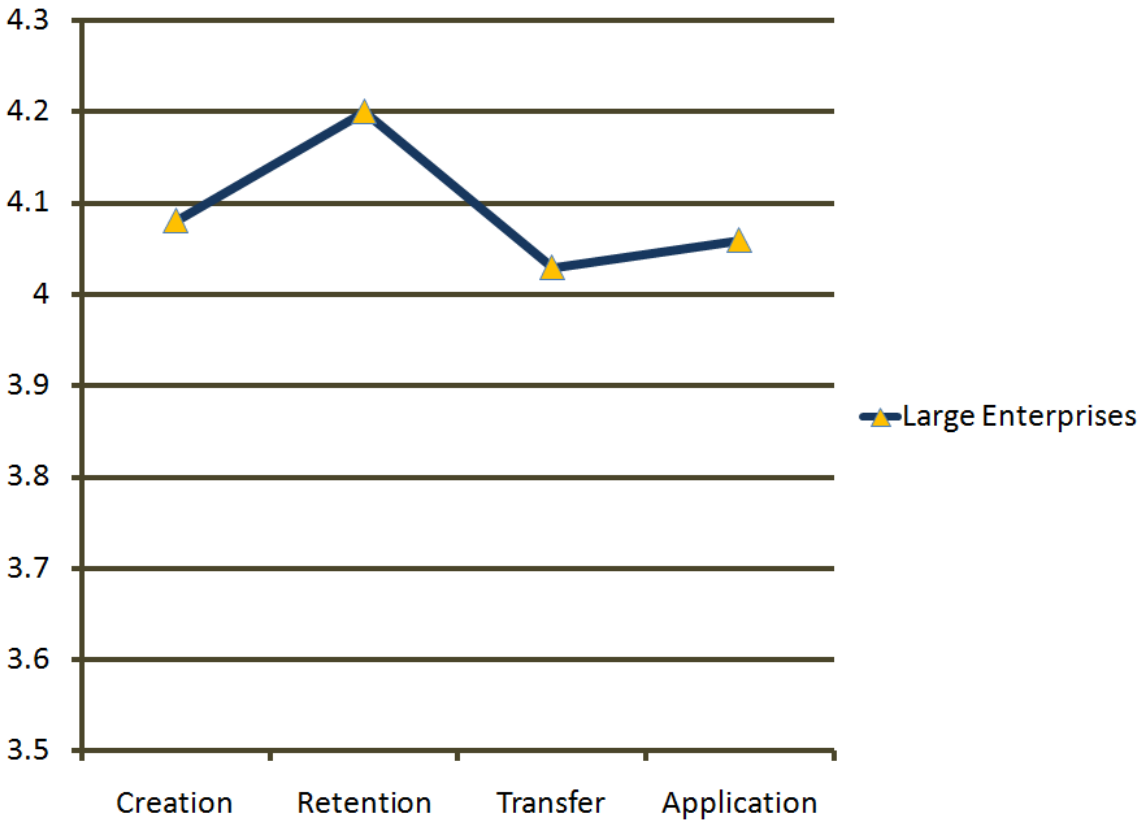

Figure 18. Statistics of large enterprises in knowledge management processes

As observed from Figure 18, transfer is the weakest process in knowledge management in large enterprises. As the definition of transfer and knowledge management processes introduced in Chapter 3, the weak processes in large enterprises can be concluded as:

- Transformation
- Assimilation
- Sharing
- Dissemination
- Refining

Transformation refers to creating new knowledge by using old ones that are segmented or disjointed. Assimilation involves in reducing the gap between needed knowledge and available knowledge. Sharing means approaches those delivering knowledge to users, groups and organizations. Dissemination is similar to sharing but asks for encouragement, efforts, and supports of communication. Refining refers to labeling, cleaning, standardizing, and abstracting knowledge platform for easy examine and search.

3.3.3 IMPROVED KNOWLEDGE MANAGEMENT PRACTICES IN LARGE ENTERPRISES

As mentioned previously, five main fields in transfer process of knowledge management should be improved:

- Transformation
- Assimilation
- Sharing
- Dissemination
- Refining

According to definition of knowledge management and the current system for knowledge management in large enterprises, there are three key manners for knowledge management:

- ICT tools and enablers
- Cultural and motivational issues
- CoPs and organizational processes

It is manifest that the weakest process in knowledge management of large enterprises is transferring. Thus, if firms want to improve knowledge management, they need to improve the main five fields. As there are three key manners for knowledge management, the goal of this chapter is to find out which manners are useful for improving efficiency of transfer process. Table 13 shows the analysis and results.

Table 13. To find out useful manners for improving transfer process of knowledge management

	ICT	Cultural issues	CoPs and organizational processes
Transformation	✘		✘
Assimilation	✘		✘
Sharing	✘		✘
Dissemination		✘	✘
Refining	✘		

Transformation is to get new knowledge transformed from old ones, which can be realized by ICT tools such as intranet, and by CoPs. Assimilation helps to find out needed knowledge from available ones, which can be realized by ICT such as content management and taxonomies, and by CoPs and organizational processes. Sharing delivers knowledge to users and groups, which can be realized by ICT tools such as emails and customer relationship management. It can also be done in CoPs and organizational processes such as discussion groups. Dissemination requires encouragement, support and efforts, which can be fulfilled by cultural issues. Such kind of culture and motivation can also be obtained in CoPs and organizational processes. For example, project teams, informal meetings, and help from others in working processes. Refining, making knowledge platform be easily examined and searched, can be achieved by ICT tools such as customer relationship management, document management and taxonomies.

Thus, to improve transfer process in knowledge management, large enterprises need to choose manners work most efficiently and cover all these five main aspects. It is obvious in Table 13 that the best way to improve knowledge management in large enterprises is to improve the application of ICT tools, and to promote CoPs and organizational processes.

It has to be emphasized that for *knowledge management*, cultural issues are not denied to be important elements. They should also be highlighted for knowledge management in large enterprises. However, for the *improvement of current knowledge management* in large enterprises, it is shown that culture is not the basic point for these enterprises.

4 EMPIRICAL DATA

4.1 BACKGROUND OF INTERVIEWS

To prove the validity of the result in Chapter 3.3, researches are carried out for empirical data. Interviews are proceeded to gather empirical data and content analysis is used to analyze the data. Comments from interviews are collected, which are used as empirical findings in this thesis.

Interviews involve 5 employees and managers from 5 different large enterprises, thus to find out if knowledge management implemented successfully throughout the enterprises. Enterprises are all located in China and in different industries. Dialogues are carried out and comments of interviewees are recorded with permissions. The years of working of interviewees are at least 3 years and all of them have heard knowledge management before during their work. The interviewees and their relevant information are shown in Table 14.

Table 14. Interviewees and relevant information

Respondent	Years of working	Title	Enterprise	Industry
Emily	5	Team leader	New Oriental Education & Technology Group	Education
Ke	3	Employee	Sichuan Yuanda co., LTD	Real estate/food industry/entertainment & culture
Ann	3	Employee	China Post	Postal service
Fang	3	Assistant accountant	China Construction Bank	Financial industry
Haibo	3	Assistant engineer	Guangzhou CNC equipment co., LTD	Mechanical manufacturing industry

The questions of interviews are prepared well since September and interviews start at the end of October. They end in the middle of November. For each interviewee, the same questions are asked and they all propose answers and comments from their own perspectives. Despite of personal matters, Table 15 shows the level of

knowledge management of each company in respective industry, from the interviewees' perspectives.

Table 15. *The level of knowledge management companies are at*

Enterprise	Industry	Level (compared with average level)
New Oriental Education & Technology Group	Education	Higher
Sichuan Yuanda co., LTD	Real estate/food industry/entertainment & culture	Equal
China Post	Postal service	Lower
China Construction Bank	Financial industry	Higher
Guangzhou CNC equipment co., LTD	Mechanical manufacturing industry	Equal

Interviewees are also asked about at which level of knowledge management they think their companies are at in respective industry. Because these companies are at all different levels and most of them are not less than the average level in respective industry, they are seen as feasible and reasonable respondents.

4.2 Empirical Findings

During interviews, the definition of knowledge management is asked to give from interviewees' perspective. The result shows that all interviewees have known knowledge management well in their previous working experiences;

> *"…Knowledge management is the publishing, sharing and communication of knowledge provided by managers and excellent employees, through Internet and ICT, eventually managing knowledge in order…"* (Emily)

> *"...Knowledge management is the process to promote efficiency that corporations collect useful and available resources in one system, storing, communicating and assimilating information and knowledge…"* (Ke)

> *"…Knowledge management is the process to define, collect, organize and apply organizational knowledge and assets, through ICT and organizational processes…"* (Fang)

> *"…Knowledge management is an effective tool to manage an organization. It unites staff with advanced knowledge and corporate culture…"* (Ann)

All interviewees think knowledge management important in enterprises. Most of the enterprises emphasize knowledge management and highlight its importance inside the company, which refers to the culture issues of knowledge management inside large enterprises;

> *"…Knowledge management is very important. It can convert the knowledge of organizational members to the assets of the organization. …I heard of this concept during my previous work and it is really emphasized in our company…"* (Emily)

> *"…I think KM is important in practical work. It can promote the communication of knowledge and information, thus to solve problems more correctly and effectively. …Knowledge management is mentioned but not that highlighted in our company and some of my colleagues have never heard of this. So it is very important for us to emphasize this concept for further improvement…"* (Ke)

> *"…Yes, it is important because it can provide ways to orderly manage assets of enterprises. …I heard of this concept before in my work and company emphasizes it very much. …There must be many colleagues know it better than me. …Company really pays lots of attention into this filed…"* (Fang)

> *"…I really feel it important that it provides and analyses information accurately, and delivers feedbacks effectively. …It is surely applied in our daily work especially the data analyze system and organizational information platforms…"* (Ann)

> *"I think it is important. It can optimize the management process and promote the operational efficiency inside the company. …There are some actions taken related to knowledge management and there are relevant trainings in our company; however, the concept is not emphasized and I have not heard of it in my work process. …I do not think there are colleagues else know this better than me. I think most of my colleagues have never heard of this…"* (Haibo)

Talking about the IT tools most frequently used in company, all interviewees think ICT important in knowledge management. Most interviewees think IT tools provided by enterprise can fulfill their needs during work, which refers to the ICT tools used in large enterprises;

"…ICT tools are important of course. The most frequently ones I use in daily work are computers, Outlook, Microsoft office and internal system of company. …Yes I use them every day and they can fulfill what I need in daily work…" (Emily)

"…ICT tools most frequently used are surely computers and phones. …they can fulfill the need in daily work and I use them every day…" (Ke)

"…computers and phones, for me especially IE in daily work. …the ICT tools provided by company can fulfill what I need …" (Fang)

"…the most frequently IT tools are the email system and the internal business system of company. …yes, I think the tools provided by company can totally fulfill my demands. I can easily get and operate information fast and efficiently…" (Ann)

"…the most frequently IT tools for me in daily work are computer, phone and instant messengers. …however, IT tools provided by company cannot fulfill demands in work. Actually is because of the speed of IT tools which is really slow for daily work…" (Haibo)

Organizational processes and CoPs are discussed in interviews. Interviewees think organizational processes and CoPs are important for company. They are clear that which steps of organizational processes they are at, and what kind of CoPs they usually use in daily work. Only one interviewee gives the feedback that had never used CoPs in his daily work;

"…It is the structure of an organization inside the company. …it involves the operational relationship and the allocation of responsibilities across departments. …the organizational processes I usually are those related to implementation. …and in process of my work there are cooperation and communication across departments… CoPs are also important part of knowledge management in our company. …those I usually use are academic group and system of New Oriental Education & Technology Group…" (Emily)

"…organizational process, from my perspective, is the model of management of a company. It refers to dealing with routines and examining them, in order to ensure the normal operations of the company and to improve the efficiency. …my job is always related to information deliver. …I also use CoPs often… …the most frequently ones used in my daily work are instant messengers and BBS…" (Ke)

"…it is just the process of daily work for me. …it involves a series of activities for the objective of organizational operations. …my job is more or less relevant to the creation and application of knowledge and communication inside the departments… …CoPs are frequently used in my daily work… …those most frequently used are tools inside company. For example, intranet or some other meetings…" (Fang)

"…the organizational process is the process of organizational operation. …I am at the end step of organizational processes, offering services to our customers and other companies... …yes CoPs are also important from my perspective. I think I use CoPs in my daily work like trainings and internal discussions…" (Ann)

"…there is not a very clear concept of organizational process for me. …but I think it is relevant to the operation of daily work. …my job is more related to the training of employees… … or maybe the creation and transformation of knowledge… …I have never heard of CoPs in my work... …I think it is because that there is no need for me to use such kind of tools in my work…" (Haibo)

Finally, interviewees are asked their perspectives of improvement of knowledge management. They show their point of views about which is most important one element if to improve knowledge management in their own companies, or in large enterprises;

"…the most important element for improvement of knowledge management in large enterprises for me is organizational process and CoPs. …organizational process is the base of normal and success operations of enterprises. …it is necessary for us to optimize and improve organizational processes constantly according to the needs of company; then to ensure the management and operation… …from my perspectives, CoPs are significant since we need store and share the knowledge of managers and other members inside company. …and it is necessary to provide us expert platform and group for knowledge management…" (Emily)

"…I think the most important part to improve knowledge management is improving organizational processes and CoPs. …I think culture can be formed in the constant operations of the company, and organizational process is the base of those operations. …knowledge management can be improved only with perfect establishment of CoPs… …then communicate and manage knowledge, applying existing experiences and data in future work, in order to keep best competitive advances…" (Ke)

"…creation is the motivation and source of improvement of enterprises. Sharing of knowledge can take advantage of creations and innovations. Organizational culture is surely important in this field; however, the share of knowledge and creations requires platforms, which are offered by CoPs. …organizational process also plays important role for knowledge management improvement. It ensures the efficient and fluent operations of an enterprise. …it is really significant to highlight the reasonability and feasibility of organizational processes…" (Fang)

"…actually I would love to choose two parts for improvement of knowledge management, ICT and organizational processes. …Banks are enterprises who emphasize comprehensiveness; thus the handling and analyze of data are playing significant roles, which requires better and even the best supports of ICT. …meanwhile, it is necessary to have simple but efficient, reasonable and feasible organizational processes. …yes from my perspective, for improvement of knowledge management, the most important elements are ICT and organizational processes." (Ann)

"…actually I hope to improve the cultural issues in my company since it is really not that highlighted; but for most large enterprises, CoPs are surely important. Things can be improved such as trainings and discussions. …smooth organizational processes are also very important for improvement of knowledge management, and even more important, from my perspective, than ICT tools…" (Haibo)

4.3 Results

From the comments of interviewees, definitions and processes of knowledge management are shown to be almost same as that in this thesis. Culture, organizational processes and CoPs, and ICT tools are all seen as important for knowledge management in large enterprises.

Firstly, for cultural issues, all respondents think knowledge management important and good for large enterprises. Three companies highlight knowledge management a lot, even more than competitors, and one emphasizes knowledge management at a relative weaker degree. The other one company ignores knowledge management. In Table 16, current cultural issues of knowledge management in five large enterprises are shown.

Table 16. Current cultural situation of knowledge management in five large enterprises

Enterprise	Industry	Current cultural situation
New Oriental Education & Technology Group	Education	Highly emphasized
Sichuan Yuanda co., LTD	Real estate/food industry/entertainment & culture	Emphasized
China Post	Postal service	Ignored
China Construction Bank	Financial industry	Highly emphasized
Guangzhou CNC equipment co., LTD	Mechanical manufacturing industry	Highly emphasized

Secondly, respondents give feedback of ICT tools used in knowledge management. All of them think ICT important in knowledge management and frequently used in daily work. Four of the respondents' daily work can be fulfilled by ICT tools provided by companies, while one cannot be fulfilled, as shown in Table 17.

Table 17. Current situation of ICT tools used for knowledge management in five large enterprises

Enterprise	Industry	Current situation of ICT tools	
		ICT tools provided by company can fulfill needs in daily work	Importance
New Oriental Education & Technology Group	Education	Yes	Important and frequently use
Sichuan Yuanda co., LTD	Real estate/food industry/entertainment & culture		
China Construction Bank	Financial industry		
Guangzhou CNC equipment co., LTD	Mechanical manufacturing industry		
China Post	Postal service	No	

Thirdly, organizational process and CoPs are discussed and four interviewees have clear concept of organizational process. These four respondents have used CoPs in their daily work frequently. There is one respondent without clear concept of organizational process. This respondent has never used any CoPs in daily work

either, which is because of the property of his work. The current situation of organizational process and CoPs is shown in Table 18.

Table 18. Current situation of organizational process and CoPs in five large enterprises

Enterprise	Industry	Current situation of organizational process and CoPs
New Oriental Education & Technology Group	Education	• Clear concept of organizational process • Frequently use CoPs in daily work
Sichuan Yuanda co., LTD	Real estate/food industry/entertainment & culture	
China Construction Bank	Financial industry	
Guangzhou CNC equipment co., LTD	Mechanical manufacturing industry	
China Post	Postal service	• Without clear concept of organizational process • Never use CoPs in daily work

Finally, respondents proposed their perspectives of the most important elements to improve knowledge management in large enterprises. As shown in Table 19, organizational culture is mentioned twice that to emphasize it as an important element in knowledge management; however, for the improvement of knowledge management, both of these two respondents think other elements more important than cultural issues for large enterprises. One of these two respondents thinks cultural issues basic and important in his company but less in others. All five respondents highlight organizational process and CoPs. Organizational process and CoPs are mentioned as the most important element for knowledge management improvement. Besides, there is only one respondent thinking ICT tools important for knowledge management improvement.

Table 19. The most important element for knowledge management improvement for large enterprises, from the perspectives of five respondents

Respondent	Industry	Most important element for knowledge management improvement	
		Own company	Most large enterprises
Haibo	China Post	Cultural issues	Organizational process and CoPs
Emily	New Oriental Education & Technology Group	Organizational process and CoPs	
Ke	Sichuan Yuanda co., LTD	Organizational process and CoPs	
Ann	China Construction Bank	• Organizational process and CoPs • ICTs	
Fang	Guangzhou CNC equipment co., LTD	Organizational process and CoPs	

According to all the feedbacks of respondents, culture, ICT tools, and organizational process and CoPs are important in knowledge management. Firstly, for the improvement of knowledge management, ICT is significant; however, ICT tools provided by large enterprises nowadays are good enough. Thus, ICT is not the main element for knowledge management improvement in large enterprises. Secondly, culture is also important and basic for improvement of knowledge management; however, in most large enterprises nowadays, knowledge management is emphasized and highlighted highly enough. Thus, for improvement of knowledge management, culture is not the important one. Finally, all respondents think organizational process and CoPs important in improvement of knowledge management. They think the current situation of processes and CoPs is good but should be improved better. For example, establish more platforms and groups for sharing and creation, which are realized by CoPs, and propose more feasible, simple, efficient and reasonable organizational processes.

Therefore, the final result of empirical research shows that, in order to improve knowledge management in large enterprise, organizational processes and CoPs should be paid more attentions than cultural issues and ICT tools. Large enterprises nowadays should keep the good quality of ICT tools and high level of knowledge management culture; meanwhile, improve their organizational processes and CoPs for knowledge management.

CONCLUSION

Because of globalization and intense competition, large enterprises are facing to improve its capability of knowledge creation and improvement. It is important for enterprises, especially large enterprises today to know how to collect necessary information, to correctly analyze and refine them, to safely store them, to efficiently transfer them, and to properly apply them. To understand the current situation of knowledge management in large enterprises, and to find out the most important element for large enterprises to improve knowledge management, this thesis studies the basic theories of knowledge management, proposes theoretical structure, carried out researches, collects empirical data and finally concludes the result.

For knowledge management, this thesis introduced the background, highlighted the importance, studied the theories, and analyzed current situation. For the part of theories, firstly, background and importance of knowledge management were introduced, which leads the motivations and objectives of this thesis. Secondly, basic detailed theories were studied according to literatures, and main concepts in knowledge management were defined as ICT tools, organizational processes and CoPs, and organizational culture. Thirdly, processes of knowledge management were studied, which provides the detailed process of each link of knowledge management implementation. Fourthly, current situation and weak of knowledge management in large enterprises were analyzed, according to exiting literatures. Transfer of knowledge management was proposed as the weak link in large enterprises and the detailed steps were listed as well. Finally, current situation of ICT tools, organizational processes and CoPs, and organizational culture in large enterprises were combined with the weak processes of knowledge management. Theoretical structure was proposed, showing that the most important elements to improve knowledge management are ICT tools and organizational processes and CoPs.

Besides, for the part of researches and empirical data, firstly, interviews were made with employees and managers from five large enterprises in China. Empirical data were collected and illustrated in this thesis. Finally, empirical data was analyzed and the result showed that the most important element to improve knowledge management in large enterprises is organizational process and CoPs.

As the result, the most important element to improve knowledge management in large enterprises is organizational process and CoPs. Knowledge management involves three essential methods: ICT tools, organizational process and CoPs, organizational culture. All these methods are important in knowledge management. However, for large enterprises, to improve current performance of knowledge

management, organizational processes and CoPs are most significant, with enough potential space for improvement.

REFERENCES

Ackoff, R. L. (1989). From data to wisdom. *Journal of Applied Systems Analysis 15* , pp. 3-9.

Ahmed, K. P., Lim, K. K., & Loh, A. Y. (2002). *Learning through Knowledge Management.* Butterworth-Heinemann.

Alavi, M., & Leidner, D. E. (2001, 3). Review: Knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly* , pp. 107-136.

Alavi, M., & Leidner, D. (2001). *Review: knowledge management and knowledge management systems: conceptual foundations and research issues.* MIS Quarterly.

Anderson, J. D. (2006). Qualitative and Quantitative research.

Awad, E., & Ghaziri, H. (2004). *knowledge management.* Pearson Education International.

Bernstein, J. H. (2009, 8). The Data-Information-Knowledge-Wisdom Hierarchy and.

Boh, W. (2007, 1). Mechanisms for sharing knowledge in project-based organizations. *Information and Organization* , pp. 27-58.

Buckman, R. (1998). Knowledge sharing at Buckman Labs. *Journal of Business Strategy* , pp. 1-15.

Clarke, R. (2005). Research Methodologies.

Crosby, C. (2008). Knowledge Management for Law Firms.

Dalkir, K. (2005). *Knowledge Management in Theory and Practice.* Elsevier Butterworth-Heinemann.

Daniel, R. D., & Mishra, A. K. (1995, 3-4). Toward a Theory of Organizational Culture and Effectiveness. *organization science* , pp. 204-223.

Danijela, J. (2011). The importance of knowledge management in organizations--

with emphasis on the balanaced scorecard learning and growth perspective. *Knowledge as Business Opportunity: Proceedings of the Management, Knowledge and Learning International Conference* , pp. 33-43.

Davenport, T., De Long, D., & Beers, M. (1998). Successful knowledge management projects. *Sloan Management Review* , pp. 43-57.

Debowski, S. (2006). *Knowledge Management.* John Wiley & Sons Australia, Ltd.

Despres, C., & Chauvel, D. (1999). Knowledge Management(s). *Journal of Knowledge Management* , pp. 110-120.

Donate, M. J., & Guadamillas, F. (2011, 6). Organizational factors to support knowledge management and innovation. *Journal of Knowledge Management* , pp. 890-914.

Donnell, J. O. (2012, 9 18). *What is research?* Retrieved from The Research Whisperer: http://theresearchwhisperer.wordpress.com/2012/09/18/what-is-research/

Drucker, P. (1989). *The New Realities.* Harper and Row.

Duffy, J. (2000). The KM technology infrastructure. *Information Management Journal* , p. 62.

Duffy, J. (2001). The tools and technologies needed for knowledge management. *Information Management Journal* , pp. 64-67.

Frické, M. (2007). The Knowledge Pyramid: A Critique of the DIKW Hierarchy. *Journal of Information Science* , pp. 1-13.

Garvin, D. (1993). Building a learning organization. *Harvard Business Review* , pp. 78-91.

Grant, R. (2002). *Contemporary Strategy Analysis: Concepts, Techniques and Applications.* Blackwell Publishers.

Gummesson, E. (1993). *CASE STUDY RESEARCH IN MANAGEMENT: Method for Generating Qualitative Data.*

Hansen, T., Nohria, N., & Tierney, T. (1999). *What is your strategy for managing knowledge?* Harvard Business Review.

Hey, J. (2004, 12). The Data, Information, Knowledge, Wisdom Chain:The Metaphorical link.

Hildreth, P. M., & Kimble, C. (2002, 10). *The duality of knowledge.* Retrieved from Information Research: http://www.informationr.net/ir/8-1/paper142.html

Hislop, D. (2009). *Knowledge Management in Organizations.* Oxford University Press.

Ho, D. (2007, 7 20). Research, Innovation and Knowledge Management: the ICT Factor.

Huber, G. (1990). A theory of the effects of advanced information technologies on organizational design,intelligence, and decision making. *Academy of Management Review* , pp. 47-71.

Hull, R. (2007). The Tracking of Knowledge Management Practices. *MEASURING BUSINESS EXCELLENCE* , pp. 48-55.

King, W. (2005). Communication and information processing as a critical success factor in the effective knowledge organisation. *International Journal of Business Information Systems* , pp. 31-52.

Lee, C., & Yang, J. (2000). Knowledge value chain. *Journal of Management Development* , p. 783.

Li, Y., Tarafdar, M., & Rao, S. S. (2012). Collaborative Knowledge Management Practices: Theoretical development and empirical analysis. *International Journal of Operations and Production Management* , pp. 398-422.

López, S. P., Peón, J. M., & Ordás, C. J. (2009). Information Technology as an Enabler of Knowledge Management: A Empirical Analysis. *Knowledge Management and Organizational Learning: Annals of Information Systems* , pp. 111-129.

Mack, N., Woodsong, C., MacQueen, K., Guest, G., & Namey, E. (2011). *Qualitative Research Methods: a data collector's field guide.* Family Health International.

Maier, J., Rainer, R., & Snyder, C. (1997). Environmental scanning for information technology:An empirical investigation. *Journal of Management Information Systems* , pp. 177-201.

Martin, V., Lycett, R. M., & Hatzakis, T. (2004). Building the business/IT relationship through. *Journal of Information Technology Cases and Applications* , p. Article 2.

Mason, R. (1993, 6). Strategic information systems: Use of information technology in a learning organization. *Proceedings of the Twenty-Sixth Hawaii International Conference on System Sciences* , pp. 840-849.

Mertins, K., Heisig, P., & Jens, V. (2003). *Knowledge Management: Concepts and Best Practices.* Springer.

Miller, D. (1987). The structural and environmental correlates of business strategy. *Strategic Management Journal* , pp. 7-32.

Mu, J., Love, E., & Peng, G. (2008). Interfirm networks, social capital and knowledge flow. *Journal of Knowledge Management* , pp. 86-100.

Muijs, D. (2010). *Doing quantitative research in education with SPSS.* SAGE Publications Ltd.

Narayanan, V. K. (2001). *Managing technology and innovation for competitive advantage.* Prentice Hall.

Niu, K.-H. (2010). Knowledge management practices and organizational adaptation:Evidences from high technology companies in China. *Journal of Strategy and Management* , pp. 325-343.

NonakaIkujiro, & TakeuchiHirotaka. (1995). The Knowledge Creating Company. Oxford University Press.

Pfeffer., J., & Sutton, R. (2000). *The Knowing-doing Gap: How Smart Companies Turn Knowledge into Action.* Harvard Business School Press.

Pujari, S. (n.d.). *Social Processes: The Meaning, Types, Characteristics of Social Processes.* Retrieved from Your Article Library: http://www.yourarticlelibrary.com/sociology/social-processes-the-meaning-types-characteristics-of-social-processes/8545/

Quast, L. (2012, 8 20). *Why Knowledge Management Is Important To The Success Of Your Company.* Retrieved from forbes: http://www.forbes.com/sites/lisaquast/2012/08/20/why-knowledge-management-is-important-to-the-success-of-your-company/

Reardon, J., Hasty, R., & Coe, B. (1996). The effect of information technology on productivity in retailing. *Journal of Retailing* , pp. 445-461.

Rowley, & Jennifer. (2007). The wisdom hierarchy: Representations of the DIKW. *Journal of Information Science 33* , pp. 163-180.

Ruggles, R. (1997). Knowledge tools: Using technology to manage knowledge better.

Sailwal, B. (2009). *Importance of Knowledge Management in Distributed Software Development.* MSI,Växjö University.

Scheepers, R., Venkitachalam, K., & Gibbs, M. (2004). Knowledge Strategy in Organizations: refining the model of Hansen, Nohria and Tierney. *Journal of Strategic Inforamtion Systems* , pp. 201-222.

Schein, E. (1985). *Organizational Culture and Leadership.* Jossey-Bass.

Scott, J. (2000). Facilitating interorganizational learning with information technology. *Journal of Management Information Systems* , pp. 81-113.

Sedera, D. (2009). Knowledge Management for Enterprise Systems: Observations from Small, Medium and Large Organizations.

Servin, G. (2005). *ABC of Knowledge Management.* 7.

Swan, J., Newell, S., Scarborough, H., & Hislop, D. (1999). Knowledge Management and innovations: networks and networking. *Journal of Knowledge Management* , pp. 262-275.

Tippins, M., & Sohi, R. (2003). TI competency and firm performance: Is organizational learning a missing link? *Strategic Management Journal* , pp. 745-761.

Tisen, R., Andriessen, D., & Lekan, D. F. (2006). *The Knowledge Dividend: Creating high-performance companies through value-based knowledge management.* Financial Times Prentice Hall.

Zack, M. (1999). Developing a knowledge strategy. *Califonia Management Review* , p. 125.